# JOURNAL

OF THE

# BATH AND WEST AND SOUTHERN COUNTIES SOCIETY.

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OF THE

# BATH AND WEST AND SOUTHERN COUNTIES SOCIETY

FOR THE

ENCOURAGEMENT OF

AGRICULTURE, ARTS, MANUFACTURES AND COMMERCE.

ESTABLISHED 1777.

FIFTH SERIES.

VOL. X.

1915–1916.

WORK AND LEARN.

LONDON:
EDWARD STANFORD, LD., 12 TO 14, LONG ACRE, W.C.
1916.

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*Price to Non-Members, Six Shillings.*

" He that goes about to forward agricultural improvement must begin by finding out the true reason of what is called routine, or ' the custom of the country.' It sometimes happens that these reasons are only accidental, and then you may dismiss them fearlessly ; but often it turns out that every-day practice rests on a solid foundation of facts ; and then if you make an onslaught on local prejudices, they will be sure to beat you."

" The true course for the agricultural improver is, to take one step at a time, to gain a clear insight into facts by experience, not to try to go too fast, and to trust to the work of time."

" If practice which sets up to do without theory is contemptible, theory without practice is foolhardy and perfectly useless."—*From the Rural Economy of England, Scotland and Ireland,* by LEONCE DE LAVERGNE.

*Journal communications should be addressed to the Editor,*
3, *Pierrepont Street, Bath.*

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# JOURNAL

OF THE

# BATH AND WEST AND SOUTHERN COUNTIES SOCIETY.

## Original Articles and Reports.

### I.—THE SOCIETY AND THE WAR.

*By Thos. F. Plowman.*

### PAST AND PRESENT.

The Society, inasmuch as it came into being previous to the French Revolution, the revolt of the American Colonies, and the Napoleonic Wars, has lived through more than one crisis in the national history and has survived more than one social upheaval. Yet its past records during these eventful periods convey that it was but little affected by the momentousness of the times in which it lived. It seems to have pursued " the even tenor of its way " amid the clash of arms, undisturbed by happenings which were shaping the destinies of Europe and of our Colonies.

After a long lapse of years, its tranquil calm has been rudely broken in our own days, for it cannot be said that the greatest of wars that has ever desolated the earth has failed to leave its mark upon the old Society. For the information of posterity, it has been thought desirable that there should be some record showing how far the Society was affected by the War and how it met the difficulties resulting therefrom, more especially in connection with the Annual Show ; hence this article.

### THE IMMEDIATE EFFECT OF THE WAR.

When, in the opening days of August, 1914, the thunderbolt forged by the Kaiser descended upon a peaceful world, the Society was making the necessary arrangements for holding its 1915 Show, as previously agreed upon, at Worcester.

The natural and immediate effect of the declaration of War was to distract the attention of the whole country from everything else. The war-cloud burst with startling suddenness, for, so unsuspicious had the blessings of peace rendered most of us, that only a comparatively limited few had the prescience to read previous portents aright. When the crash came its effect was overwhelming in a national sense, and every mind was bent upon considering, to the exclusion of every other topic, how the sudden emergency could best be met. Agricultural Shows at this moment shared the fate of other institutions outside the area of the War, and any thought for them was relegated to a time of less stress and strain in other directions.

In the course of a few weeks it began to be realised that, whether the War was destined to be long or short, there was no immediate danger of the country being defeated by force of arms, or—thanks to the British fleet—starved into submission. Men's minds then began to be directed to the question as to how far the current of ordinary life should be deflected on account of the War, and those responsible for the conduct of the Society had to consider whether or not, under prevailing circumstances, it was either practicable or desirable to hold a Show in 1915.

## THE ACTION OF THE COUNCIL.

The subject first came under discussion at a Meeting of the Society's Council, held on October 27th, 1914, when it was resolved that the matter be referred to the Show Place and Dates Committee with a view to their reporting upon it to an adjourned meeting of Council to be held on November 24th.

The next step was to elicit the views of the City of Worcester and the Herefordshire and Worcestershire Agricultural Society ; the latter, in consequence of having associated itself for the year with the Bath and West Society, had abandoned its own Show for 1915.

The Committee in question met the Mayor of Worcester and other Members of the Local Committee, together with representatives of the Herefordshire and Worcestershire Society on October 31st, 1914, at Worcester. At this Meeting it was stated that the Local Committee felt unable, in view of the many appeals being made in the City and County on behalf of funds connected with the War, to fulfil their undertaking with respect to the payment to the Society of the sum of £800 towards the expenses of the Show. A suggestion was then made that if the Local Committee were prepared to contribute half the sum agreed upon, the Show be held, but that it consist mainly of exhibits of an agricultural character. At a later Meeting the Local Committee resolved that they would welcome the holding of the Show on these terms, and this decision was heartily endorsed by the Herefordshire and Worcestershire Society.

At a Meeting of the Society's Council, held at Bristol on November 24th, 1914, the Show Place and Dates Committee reported what had transpired, and recommended that the Show be held upon these terms. After considerable discussion, 10 voted for and 10 against the adoption of the Report, which was carried by the casting vote of the Chairman. The aforesaid Committee were then requested to consider what modifications could be made in the 1915 Show to meet the altered circumstances, and, at an adjourned Meeting of Council, it was resolved, as recommended in the Committee's Report, that the Butter Test, Poultry, and Shoeing Classes, and the Nature Study and Forestry Sections be omitted for the year and that some economies be carried out in other directions.

## REASONS FOR HOLDING THE SHOW.

In view of the difference of opinion existing, as to the desirability, or otherwise, of holding the Show, the following notification of the decision of the Council was issued to the Members :—

"The Society's Annual Show will be held at Worcester, on May 20, 21, 22, 24 and 25, the Council having resolved, that, notwithstanding the exceptional conditions prevailing owing to the War, it was desirable that the Show should take place as originally arranged.

This conclusion was arrived at mainly on the following grounds :—

(1) That the principal object of the Show being the advancement of the Nation's greatest industry and the encouragement of enterprise in its pursuit, it was desirable to maintain, if possible, the continuity of its existence, even at a time of unusual stress and strain.

(2) That if the Show were not held, Stock-breeders would be deprived of a very valuable medium for bringing under public notice the animals which, under any circumstances, they must maintain in good condition with a view to the future. At the same time, implement makers and manufacturers of agricultural appliances, feeding-stuffs, fertilisers, etc., would suffer from lack of opportunity to

exhibit the results of that inventive skill and commercial acumen, which have done so much for agriculture in the past.

(3) That the Herefordshire and Worcestershire Agricultural Society, in alliance for the year with the Bath and West Society, very strongly urged upon the Council the desirability of holding the Show.

(4) That the Worcester Local Committee also favoured the holding of the Show under such modified conditions, with respect to their financial responsibility, as the Council felt justified in acceding to.

The opinions expressed since the decision was made, and which have been endorsed by the principal Breed Societies, as shown by their liberal contributions to the Prize List, lead to the conclusion that the course pursued meets with the approval of agriculturalists generally.

In view, however, of the additional expenditure involved in holding the Show at a time when the cost both of labour and material is abnormally high, the Society needs all the support that can be accorded to it at this juncture. Therefore the Council ask the good offices of the members in strengthening its ranks by inducing others to join them."

The appeal in the last paragraph met with a very satisfactory response, both with respect to the nomination of new Members and the retention of old ones.

## THE GOVERNMENT AND THE SHOW.

Although the course the War has run has done much to discount the too-confident phrase, "business as usual," there are some businesses which have to be carried on under any circumstances for the sake of the nation at large, inasmuch as any cessation of their activities would mean irreparable injury to the State. First and foremost, in this category, comes Agriculture, and this has been realised by the Government, who, by their numerous appeals to all concerned to use every effort to stimulate the productiveness of the soil and to increase the stock-raising capabilities of the farm, have conveyed to one and all that, whatever happened to other industries, there must be no slackening of effort with regard to Agriculture. The especial necessity of encouraging the manufacture and use of agricultural implements and machinery was recognised by the Government. In fact, the Board of Agriculture and Fisheries had, just previous to the Show, called a Conference (at which the Society was represented) of Agricultural Society Officials and others interested in the subject, in order to consider how far these organisations could, by promoting the use of labour-saving machinery, in connection with their Annual Shows and in other ways, do something to meet the present shortage of farm-hands owing to recruiting. So that, so far as the State was concerned, there was little room for doubt as to the expediency of holding the Show.

### THE SUPPORT OF THE KING.

A most gratifying circumstance to all concerned was the support of the Show by the King, who made a larger number of entries than he had done at any previous Bath and West Show. They included horses, cattle and sheep, and were from both the royal farms at Windsor and Sandringham. In addition to this, a few days before the Show opened, His Majesty was graciously pleased to honour the Society by becoming a Life Governor, and causing a cheque for £20 to be forwarded to the Society in connection with the office.

### UNREALISED FOREBODINGS.

The most important point remained to be settled, namely: whether the forebodings of those who were opposed to the holding of the Show were likely to be realised. Fears had been expressed that Stock-breeders and others would be unable to send exhibits owing to the labour difficulty being accentuated by recruiting; that Implement Exhibitors would be similarly placed, or else would be too busy with Government orders to be able to entertain exhibiting; that the Railway Companies would be too much monopolised for State purposes to undertake the conveyance of exhibits; and that the public, being in no mood to attend Shows, would boycott the Exhibition.

Happily, none of these prognostications materialised, for the chief breeders of stock and the leading implement firms entered as usual. In point of fact, the stock entries exceeded in number those at the large Show at Swansea in the previous year. No doubt the scarcity of labour had its effect, though not to any large extent, in the case of some Stock-breeders, whilst the reduction in the implement section was mainly in exhibits of a non-agricultural character. I think it may be said that exhibitors not only realised the advantage of the Show from a business point of view, but were ready to support it for the sake of " auld lang syne " and its friendly associations.

The *Times*, in commenting upon the Worcester Exhibition, described it as " representative in character and of a high standard of quality," and proceeded to say that—

> " The fact that so good a Show of stock and farming accessories can be provided in present circumstances is noteworthy testimony to the stable condition of the landed industry and to the wisdom of maintaining the sequence of the leading Shows."

The attendance at the Show was in excess of anticipations, bearing in mind that many agriculturists, as well as a large section of the general public, were engaged on military service; that it was held at a time when the mind of the nation was naturally very much pre-occupied with other matters; and that the Railway Companies were unable to provide the usual facilities in the way of excursion trains, etc. Notwithstanding these disabilities, the admission receipts, though, of course, considerably below the average, sufficiently indicated that, although shorn of some of its features, the Show could still hold its own with the ordinary sightseer as well as the agriculturist; an attendance of over 24,000 of the paying public on Whit-Monday serving to emphasise this.

### ADMINISTRATIVE DIFFICULTIES.

So far as the administrative side of the Show was concerned, the War undoubtedly gave rise to many anxieties, in addition to those of a financial character arising out of the enhanced cost of material —timber especially—and labour. There were constantly occurring what in old plays used to be described as " alarums," or, in more modern phraseology, " bolts from the blue," creating temporary misgivings as to whether the obstacles thereby created were capable of being surmounted. For instance, not many days before the Show opened, the Hay Contractor conveyed the startling information that he had been formally served with a notice not to part with hay to anyone but the Government, and so he did not see how, under these circumstances, he could fulfil his contract with us. As every other contractor was in the same boat, the prospect of having several hundred animals on one's hands with no provender for them was something appalling. However, a trustful belief in Providence and in the reasonableness of even a Government Department, when matters were fully explained to the latter, was not misplaced. The military powers that be, as represented by a very courteous official in charge of the district, saw the position we were in and not only removed the embargo but, in other ways, facilitated the acquisition of what we wanted. So let this be put down to the credit of the War Office in the days of its disparagement.

The Railway Companies had made it clear that, with State claims upon them, they could guarantee nothing in the way of delivery. But here also a confidence that such an intimation simply meant that they were going to do their very best to fulfil engagements but did not want to be landed in a legal liability if, through unexpected pressure in other directions, they failed in the attempt, was justified by the ultimate result, as goods came into the Yard with, if anything, more regularity than usual.

Hitherto a sleeper-road to facilitate the transit of the heavy implement traffic through the Yard had been regarded as absolutely essential, and steps were taken for its provision as usual, but, just before the sleepers were required, Government interposed and commandeered all that were available for military purposes, so we had to dispense with them. Providence, however, once more came to the aid of the Society, and conferred upon it the inestimable boon of the finest of fine weather during the whole period of the Show ; a blessing only once before vouchsafed to the Society—namely, at Southampton in 1897—within the recollection of the oldest Member. True it is that, the week before the Show, the rain reduced the implement roadway to the condition of a quagmire and one traction-engine at least was fast bound in it for some time. But a sandy soil, judicious rolling and brilliant sunshine did much, when once the Show opened, to mend matters and save visitors from inconvenience. The foregoing may be regarded as samples of not a few similar difficulties with which the executive had to deal, arising out of an abnormal condition of national affairs. The way out of them was materially smoothed by the readiness with which everybody realised that we were living in no ordinary times and that allowances must accordingly be made. Consequently, there was no friction, whilst grievances made themselves less manifest than usual.

## THE OUTWARD AND VISIBLE SIGNS OF WAR.

There was no escape from thoughts of the War in the Show Yard, for there were too many reminders of its existence, both in the absence of several energetic honorary officials who were serving King and Country, and in the presence, as is the case everywhere now, of many wearers of khaki. The recruiting-sergeants, too, were busy in all directions, for the Society offered every facility for this. Those who were told off for this duty were admitted free and provision was made in the Yard for the medical examination of likely candidates for military service. Many placards appealed to all who could to join the ranks of the King's Army, and the officers and men engaged appeared to be well-satisfied with the results of their efforts.

A sadder side of the picture was supplied by the many wounded soldiers, who were to be seen limping about, or with arms in slings, or heads in bandages. The hospitals in and about Worcester in which they were being treated petitioned the Society to grant a reduced charge for their admission to the Show. Needless to say the only possible answer was returned that the Society would be glad to see them free of any charge and to reserve seating accommodation for them on the Grand Stand and elsewhere. Then good-natured outsiders chartered conveyances to bring them to the Show, and the number of maimed men who accepted the Society's invitation was a melancholy testimony to the pain and suffering for which the War is responsible.

H.M. Office of Works, too, had a Pavilion for interviewing farmers and others with a view to helping them to fill up the gaps in labour caused by absentees on active service, whilst a further reminder of the War was afforded by a display by the Board of Agriculture and Fisheries at their Pavilion of a collection of dried vegetables, such as are being sent out to the Expeditionary Forces. In addition, many implement firms showed on their stands exhibits designed to meet war emergencies.

### THE ALL-ABSORBING TOPIC.

All other topics naturally gave way to that of the War wherever friends met in the Yard, for it was difficult to find anyone, from the President downwards, who had not a direct and deep interest in it, owing to their kith and kin having devoted themselves to the national cause.

Very fittingly, the social side of the gathering was relegated to the background, and civic and other festivities were in abeyance. The key-note was struck at the Show inauguration, the speakers emphasising the fact that the Show was held as a matter of duty and certainly not as a concession to the pleasure-loving public. As at all other gatherings, the War could no more be kept out of it than could the head of Charles I. be eliminated from Mr. Dick's vocabulary. The Council Mess, though impoverished in numbers, was reasonably cheerful, with the War holding the field as a topic.

The same could be said of the Council and Annual General Meetings held in the Yard, for the main subjects of discussion were due to the War. It is customary at this time to appoint as President of the Society some one of position and influence in the County visited, which in 1916 would be Wilts. The prolongation of the War Campaign, however, prevented any definite arrangements being made with regard to the 1916 Show, whilst the absence at the Front of noblemen and gentlemen connected with the County, whom the Society would desire to consult, and who might be eligible for the office of President, was an obstacle to the selection of the latter. Lord Coventry, by kindly acceding to the request of the Council to continue in office, pending the appointment of his successor, eased the situation in this respect, and the Annual General Meeting of Members on the following day thankfully ratified the arrangement.

### "THOUGH LOST TO SIGHT TO MEMORY DEAR."

An instance of the way in which a desire to serve King and Country appeals to the sympathies of all sorts and conditions of men was given me by a Steward who, by his kindly consideration for the stock-men over a long period, has become very much their friend and *confidant.* Walking round the cattle-lines, dropping, as was his wont, a cheery word here and there, he came across an old shepherd, who was a regular attendant at the Show, in charge of his master's exhibits. After passing "the time o' day," the shepherd asked the Steward if he had heard about Bill Burton, who was another regular Show attendant. On the Steward professing ignorance, his interrogator continued in this wise:—"Bill thought he ought to do some fightin' like the rest, and he managed to kid the chaps at the War Office that he was only thirty-five, but, lor' bless yer, he was nearer fifty than that. Howsomever they took him on, no doubt bein' glad of anybody without bein' too purtickler. So Bill's gone and now he's in the trenches. He was rather a rough 'un, was Bill, 'ticklerly when he'd had a drop, but not bad at 'eart. So me and a few o' my mates thought as we should like to send him somethink that would come in handy to him, jist to show as we hadn't forgotten him. So we clubbed together sixpence a-piece and bought him a second-hand concertina and a bit o' baccy. When the Germans ain't worryin' him, he can cheer up hisself and his pals with a tune, and baccy's allus comfortin'." As it did not appear that anyone had previously ascertained whether or not Bill had any knowledge of the musical capabilities of a concertina, or the best means of eliciting them, the amount of delight his performances have afforded his listeners is only a matter of conjecture.

No doubt the idea at the back of the mind of Bill's friends could be expressed in the words of *Punch*, slightly altered :—

> " And when we march up Potsdam Street, 'an goosestep through Berlin,
> Why Billy's concertina will play the army in."

It was a singular conjunction of gifts, but the main point, after all, was the sentiment underlying the action of his old comrades, and this did credit to their hearts. This was not an abnormal instance of kindly feeling on the part of those who tend the flocks and herds in a Show Yard. As those who are brought into immediate contact with them know, it is by no means uncommon, if a stock-man comes to a Show ill-clad and lacking the wherewithal to repair this, for his fellows privately to subscribe amongst themselves for the betterment of his condition. A big Show Yard is a little world in itself; all sorts and conditions of men, as well as animals, find a place in it, and I have never known a Show, out of the many with which I have been associated, that did not furnish some incidents worth recording, on account of the pleasant light they shed upon human traits. There are all kinds of opportunities in a Show Yard for the exchange of little courtesies, for doing neighbourly turns, and for helping lame dogs over stiles.

### Aid for Our Allies.

The devastation wrought by the War was forcibly brought home to the Meeting of the Council in the Show Yard by means of an appeal from a Committee initiated by the Royal Agricultural Society of England for the support of a fund to be raised for the purpose of assisting in the restoration of Agriculture in the countries of our Allies which had been devastated by the War. Contributions in kind, as well as in money, were asked for, and the Council, having previously made known the want to individual Members, with satisfactory results, followed this up by a grant of £100 from the Society to the funds The subject revived in me some old memories, for in the early seventies I had the privilege to be associated with a similar movement, and the ultimate effect of the effort was so remarkable and so fraught with good that it may be worth recalling.

The end of the year 1870 found the Germans, as now, in the occupation of a considerable tract of French territory. The harvest of the small farmers had, therefore, in many parts never been reaped, and in not a few instances where it had been gathered in, the corn had been commandeered by one or other of the contending forces. Under such circumstances the peasant farmers were in a pitiable plight. Then it was that the happy thought occurred to the late Mr. James Howard, M.P., that the British farmer might come to the rescue by contributing either money to purchase seeds or the seeds themselves, so that the small farmers might not be entirely stranded. Meetings were called, a good representative Committee was formed, and the proposal was enthusiastically taken up by agriculturists generally. Honorary Secretaries—of whom I was glad to be one—were appointed in the different districts to assist the scheme and collect donations in money and kind, and, in the end, no less than over £29,000 in money was contributed, almost entirely by agriculturists, together with large quantities of corn and other seeds. This was supplemented by grants from funds raised in other directions, bringing up the money total, with which the Committee had to deal, to over £52,000. The distribution of the vast quantity of seed represented by this amount was a marvellous piece of organisation, the utmost care being taken to ensure that the seeds got into the right hands and where they were most wanted. This timely action conferred an immense benefit upon thousands of French peasant farmers and their families, and their gratitude was unbounded. It resulted in thousands of acres, which otherwise would have remained untilled, bearing abundant crops of oats, barley, potatoes, vetches, maize, etc. The distribution of a large variety of new seeds in the country was, in itself, a lasting benefit, and the superiority of the crops grown from English seed was so marked that the larger proprietors sought to obtain, for future seed-times, a stock from the peasants who had been thus supplied. In fact, it was very remarkable how well the seeds turned out and how completely and adequately the good intentions of the promoters of the scheme were fulfilled. The work of reparation undertaken in 1870 was small indeed in comparison with that which is now called for, and the claim for help devolving upon us as a nation will be far greater than it was then.

## THE RISK JUSTIFIED.

The foregoing particulars will serve to convey to those who follow us the extent to which the influences arising out of the Great War affected the operations of the Society, and deflected the ordinary current of its life. The fact that the Society had the courage to tempt fortune by setting forth upon a hazardous voyage, at a time of doubt and difficulty, and succeeded in fulfilling its mission, having sustained but little material damage in the attempt, will stand as something to its credit in the years to come. At the least, posterity will admit that the Society did its best to justify its existence, and at some risk. How much the result was due to the honorary workers of the Society can be completely understood only by those in immediate contact with their efforts. The decision, by so narrow a majority, to hold the Show, did not in the least diminish the loyalty and devotion of those Stewards who had been most opposed to it, for they brought as much energy and enthusiasm as ever to bear in the discharge of the voluntary duties devolving upon them. A Society which is able to count upon such service possesses the staying power to weather many a storm.

The *Field*, in their comments on the Show, very well conveyed in the following words, the general sentiment :—

> "The Society may count upon having to face a substantial deficit, but it will do so cheerfully in the knowledge that it has rendered an important service to the national industry at a time when stimulus of the kind was peculiarly appropriate."

As will be seen from the Financial Statement on page xcvii of the Appendix to this volume, the deficit upon the Worcester Show was £1,217 10s. 5d., plus whatever the cost of the carriage of the Show Plant, now at Worcester, may be to its future destination.

In commenting upon this result, the Finance Committee, in their report to Council, said :—

> "In view of the abnormal conditions prevailing, this was considerably less than was generally anticipated, and the Committee believe that the Members generally will not consider this too big a price to pay for the service rendered to Agriculture by the holding of the Show."

## FUTURE POSSIBILITIES.

The question as to whether or not, in view of the continuance of the War, it would be possible to hold a Show in 1916 became a subject of serious consideration with the Society's Show Place and Finance Committees, who had been requested by the Council to jointly report upon the matter.

The Society, previous to the War, had accepted an invitation from Salisbury, and the first point to be ascertained was as to whether, in view of the fact that the district in which the City was embraced was a large military concentration area, there would be any difficulty with regard to the delivery of exhibits by the railway companies, and the following correspondence, with the General Managers of the G.W. and L. & S.W. Railway Co.'s. in relation thereto, took place: –

3, PIERREPONT STREET,
BATH;
September 3rd, 1915.

DEAR SIR,

Previous to the War the Society received an invitation from the Corporation of Salisbury to hold its Show in that City next year, but definite arrangements have been delayed in consequence of difficulties resulting from the War.

There is, however, a disposition both on the part of the Society and of Salisbury to hold the Show, if possible, in the interests of Agriculture, as was done this year, in the case of Worcester, with the full approval of His Majesty and those Members of the Government who have expressed their opinions upon the subject.

Before proceeding further, however, with respect to next year's Show, the Society's Council think it desirable to communicate with you with a view to ascertaining if, in your opinion, there is likely to be any difficulty with respect to the conveyance of Exhibits by rail to and from the Show, if it were held.

If, therefore, you would be so good as to favour me with your opinion with regard to this, it would materially help the Council in coming to a decision.

Of course, the Council are fully aware that circumstances might arise which would completely alter the situation, and therefore, of course, they could not expect you to enter into anything of the nature of an undertaking, but at the same time it may be possible for you to express an opinion which might guide the Council to some extent, and might enable them to take a similar course to that adopted by the Royal Agricultural Society with respect to their Show next year at Manchester.

As it is very desirable, in view of the arrangements which have to be made beforehand, that the matter should be settled very shortly, it would add to the Society's indebtedness to you if you could communicate with me at your early convenience.

I am,
Yours very faithfully,
THOS. F. PLOWMAN, Secretary.

" GREAT WESTERN AND LONDON AND SOUTH-
WESTERN RAILWAYS,"
LONDON ;
14th Septemer, 1915.

DEAR SIR,

In reply to your letter of the 3rd instant in which you say that your Society have received an invitation to hold their Annual Show next year at Salisbury, and request an expression of opinion from the Railway Companies on the proposition, we have to say that we appreciate the courtesy of your communication and should be very glad indeed if we could see the way to reply to it in a favourable sense.

As it is, however, the circumstances of the present time have very greatly affected the railways in the neighbourhood of Salisbury, and the fact that the district is now a large military concentration area imposes such an exceptional strain upon the resources of the Companies in the district, that unless they could be assured that substantial relief would be afforded between this and the time for holding the Show next year, they could not possibly contemplate handling Show traffic in addition to the very heavy business associated with the War. Unfortunately such assurance is not likely to be forthcoming, and it is therefore regretted that we are not in a position to encourage the idea of holding the Bath and West and Southern Counties Show at Salisbury.

Yours faithfully,
H. A. WALKER,
General Manager, L. & S. W. Railway.

FRANK POTTER,
General Manager, G.W. Railway.

Much as the Committee regretted to come to such a decision, it was felt that, in view of this very definite statement of the railway companies, it would be impossible to hold the Show at Salisbury in 1916, and the Committee reported accordingly to the Society's Council.

The Salisbury Local Committee regretfully came to the same conclusion, their notification of this being accompanied by the expression of a hope that, when the War was over, their invitation to the Society would be accepted.

The matter came under consideration at the October meeting of the Society's Council, when the report of the Joint Committees was unanimously adopted, whilst the desire of the Salisbury Local Committee, that the Show should be held in that City at the earliest opportunity, was cordially endorsed on behalf of the Society.

It was resolved that, in the interests of Agriculture, a Show should, if possible, be held in 1916, and a general feeling was expressed that if an application were received from any suitable locality desirous of receiving the Society, it should receive the favourable consideration of the Council; the matter being referred to the Joint Committees with power to act.

## II.—THE FEEDING OF COWS.

*By Dan W. Stewart, B.Sc., C.D.A., University College, Cardiff.*

According to the manner in which things have been arranged, it is the rôle of plants to purify the air, to gather simple materials from both air and soil, and to utilise the rays of sunlight, in order to store up energy, and manufacture complex food materials in their bodies. Man, in common with cows and other animals, helps to undo this great work of the plants. We feed upon their bodies and use them as food, breaking down the complex materials they have formed, and dissipating the energy they have stored up.

Before plant food can be of any use to the animal, it must be digested, broken up into simpler and more soluble substances, so as to be able to pass into the blood stream. Thence it goes to nourish the tissues. The indigestible part of the food, after successfully resisting all the chewings, and churnings, and treatments which the digestive system of the animal can muster, passes away as excrement. Slowly, but ceaselessly, it is then broken down by those tiny germs in the soil which cause putrefaction and decay, and thus once more it becomes food for new plants.

The digested part of the food is partly built up into such complex substances as constitute the animal body; and these renovate the muscles, nerves, cartilages, and other tissues of the body. Partly it supplies energy to pump the blood through the arteries and veins, to work the breathing apparatus, and to do all that other internal work which the laziest animal must do. Then, too, part of the digested food is consumed to keep up the body temperature; for the temperature of the cow being about 102°F. and the temperature of the air about 60°F., the animal loses heat to the air in proportion to its surface.

A "maintenance ration" is one which supplies just enough digestible food to satisfy these essential requirements of the animal body—just enough to keep a healthy cow in decent condition, neither losing nor making weight, neither working nor producing milk.

All foods contain a certain proportion of water; the other part being composed of dry matter. If the water is all boiled away only the dry substance remains. Most of the dry substance can be burnt away in the form of various gases: this is called the organic matter. The part which remains behind after burning is called the mineral matter, or ash. A chemical analysis of the food shows the organic or combustible matter to consist of crude protein or albuminoids, oil or fat, and soluble and insoluble carbohydrates.

The amounts of the different nutrients stated in an analysis do not indicate what proportion of each of these is digestible. The digestible constituents can, however, be calculated from tables which have been constructed for the purpose from the results of actual digestion experiments.

The ash, or mineral matter, of the food—which includes potash, lime, soda, and phosphates—goes to form the mineral matter of the body, viz.:—the ash of bone, the salts of the blood, and the ash of milk. The digestible oil, or fat, of the food may form body fat, or it may be burnt to produce body heat. The digestible part of the carbohydrates (and fibre)—starch, sugars, mucilage—may go to produce body fat, the fat of milk, or the sugar (lactose) of milk, but it mainly produces animal heat. The digestible albuminoids, or proteins, of the food can give rise to fat and heat, too, but it does not pay to use this food ingredient for such purposes more than can be helped. The albuminoids are used to do something that fats and carbohydrates cannot do. They give rise to the albuminoids of the body, such as lean flesh, gristle, skin, hair, hoof and horn; and to the proteins of milk, namely, casein (curd) and albumen. In a ration we must aim at supplying the essential digestible albuminoids but no more. Home-grown foods are usually deficient in this constituent, so we have to purchase expensive cakes and meals to supply our stock with the necessary amount.

When the maintenance requirements of a good dairy cow have been satisfied, any excess of digestible food will be used, with a variable degree of efficiency, for the manufacture of milk. The yield of milk cannot, however, be increased indefinitely by feeding more and more food. Each cow has a certain capacity to form milk and this is largely determined by heredity. A limit, then, is set by the capacity of the cow to form milk. When, or before, this *absolute* limit of milk production is reached we arrive at the limit of *profitable* milk production : a point is reached where the cost of any extra food supplied would exceed the value of the increased yield of milk. Consequently, if the price of milk or its products is high, we can afford to feed at a slightly heavier rate than when the price is low.

The quantity of milk yielded daily by a cow depends on the individuality of the animal, the breed, the length of time which has elapsed since calving, the time of the year at which the cow calved, the age of the cow, the season of the year, the number of milkings per day, the thoroughness of milking, whether the cow is pregnant or not, the health of the cow, the weather conditions she is subjected to, the regularity and gentleness of treatment, and so on. Provided that the food is sufficient and suitable, the influence of extra feeding is very limited. If the cow is overfed she puts on flesh and fat, and gradually the milk yield falls off. If perpetually underfed, she first loses weight and ultimately the milk yield becomes unsatisfactory. Pasture grass, wet brewers' grains, and a few other foods have a stimulating effect on milk production. In general it may be said that food only exerts an influence within the capacity of the mammary gland to produce milk; but, nevertheless, the working efficiency of the gland depends on the feeding. A cow which at no time exhibits good milking characteristics cannot be forced to produce large quantities of milk, even with a most abundant and nutritious diet. For successful milk production, cows of high individual merit are the first essential. Hence it is always desirable to buy a good milk cow with a good milking pedigree, to feed her adequately, and put her to a good " dairy " bull --she will then not only milk well herself, but her progeny will also amply repay the cost of their food.

The richness of milk in fat is influenced by practically the same factors as those which affect the milk yield. If a cow is underfed the yield, rather than the quality, is first affected. In general, feeding has a slow effect on the hereditary richness of the milk—a provision which nature has made in consideration of the welfare of the calf. The daily yield of fat cannot be increased, by feeding, beyond a certain point. Therefore, to increase the yield and quality of the milk of a herd, we must rely, not so much on feeding, as on selective breeding. From the preceding, it is evident that food may be given in excess of what is profitable, or so made up as not best to suit the requirements of the animal. In either case there is waste.

For the purpose of assisting practical men in the making up of rations, feeding standards have been suggested from time to time. The aim of a feeding standard is threefold :—First, to provide an adequate supply of the necessary food ; secondly, to avoid excess ; and, thirdly, to help towards supplying the necessary constituents in the cheapest form.

The daily ration of a cow must be looked upon as consisting of two portions : (*a*) the maintenance portion, and (*b*) the productive portion. The maintenance requirements of a cow depend solely on her size. The production requirements depend on the yield of milk, the quality of the milk, the age of the cow, and, if she be in calf, on the age and size of the fœtus.

In the method of feeding to be described here, which has been simplified as far as possible, the amount of food is measured in "food units." A "food unit" is that weight of any food which will maintain 330lbs. of the live weight of an average cow, or which will provide sufficient nutriment for the production of 6·6lbs. of milk containing 3·5 per cent. fat. The following are the details of the feeding standard :—

(*a*) *Maintenance.* A cow requires every day 3·02 food units if she weighs 9 cwts. For every extra 1 cwt. give her ·22 food units. For each food unit in the maintenance part of the ration, supply ·21lbs. of digestible (true) protein or albuminoids.

(*b*) *Production.* For every 10lbs. of milk yielded, supply daily 1·52 food units. If the milk contains over 3·5 per cent. of fat, supply ·28 food units extra for every additional 1 per cent. of fat. Thus, if the milk contained 4·5 per cent. of fat, the allowance per 10lbs. milk would be 1·52+·28=1·80 food units. For every food unit in the productive part of the ration, supply ·3lbs. of digestible protein. If the cows are young and still making considerable growth (first or second calf), they require extra food to the extent of about one unit, to enable them to develop normally. In-calf cows, even though the milk yield has diminished to less than 10lbs. daily, would always get 1½ to 2 food units in the productive part of their ration, to supply nutriment to the developing calf. (A gallon of milk weighs about 10lbs.).

The method to pursue in drawing up rations for a herd of cows is roughly as follows. Estimate the average live weight of the animals. Based on that and the average milk yield, and the quality of the milk, estimate the number of food units to be supplied daily and the amount of protein which the ration should contain.

Having got so far, it only remains to translate your feeding standard into lbs. of the various foodstuffs. The table appended hereto shows the weight in pounds of any foodstuff which would supply one unit of digestible ingredients. It also gives the amount of digestible protein in such a unit, and, in the last column, the quantities of each foodstuff usually employed in practice.

The main point to consider in chosing foods to make up a ration will be the question of cheapness. To produce milk economically, we must utilise home-grown materials as much as possible, and only make up the deficiency of the ration in protein by purchased concentrates—cakes and meals rich in protein.

Suppose the average weight of a herd of cows is 9 cwt., each yielding 20lbs. of milk containing 3·5 per cent. of fat. In this case, each cow on the average would require, daily, 6·06 food units containing 1·54lbs. of digestible protein. Realising as we now do, that the secret of success in the feeding of cows lies in giving them individual attention, we should give heifers about a food unit extra, and to each cow giving 10lbs. more (or less) than the average yield of 20lbs., we would supply 1·52 extra food units (or 1·52 less) of concentrated foods. The average ration of our herd might be :—

| | | |
|---|---|---|
| Mangels ... | 61½lbs. | ... 2⅔ food units. |
| Oat Straw ... | 6¼lbs. | ... ⅔ ,, ,, |
| Hay ... ... | 2¾lbs. | ... ½ ,, ,, |
| Bran ... ... | 3·3lbs. | ... 1 ,, ,, |
| Decorticated Cotton Cake | 2·9lbs. | ... 1½ ,, ,, |
| | | 6⅓ ,, ,, |

If our herd consisted of Jerseys, weighing 7 cwts., with an average yield of 20lbs. of milk containing 5 per cent. of fat, their average daily ration should contain 6·46 food units with 1·7lbs. of protein. The average ration might be :—

| | | |
|---|---|---|
| Mangels ... ... | 17lbs. | ... ¾ food units. |
| Hay ... ... | 11lbs. | ... 2 ,, ,, |
| Straw ... ... | 7lbs. | ... ¾ ,, ,, |
| Maize Meal ... | 2·8lbs. | ... 1½ ,, ,, |
| Decorticated Cotton Cake | 2·9lbs. | ... 1½ ,, ,, |
| | | 6½ ,, ,, |

Similarly a herd of Shorthorns, weighing 12½ cwts., and giving 30lbs. of milk containing 3·75 per cent. of fat, would require on the average 8·56 food units containing 2·23lbs. of protein. The average ration might be :—

| | | |
|---|---|---|
| Wet Grains | 22lbs. | 2 food units. |
| Swedes | 42lbs. | 2 ,, ,, |
| Hay | 13½lbs. | 2½ ,, ,, |
| Treacle | ·9lbs. | ¼ ,, ,, |
| Peasemeal | 3·2lbs. | 1½ ,, ,, |
| Bran | 1·6lbs. | ½ ,, ,, |
| | | 8¾ ,, ,, |

Apart altogether from the feeding standards the table of feeding stuffs can be used in another way. Suppose, for example, that we have been in the habit of using a certain very successful ration containing 3lbs. of undecorticated Bombay cake, and that this cake has become so expensive that it must be replaced by its equivalent of some other food. If decorticated cotton cake is cheap in proportion, it does not require much calculation to see that 1½lbs. of it would serve the purpose effectively.

Before cows are turned out to pasture in Spring, the grazing should be reasonably abundant, so that they can eat sufficient without having to work too hard in finding it. The change from in-door feeding to pasture should not be too sudden, and the dry fodder should be continued as long as the animals will eat it. This tends to economise grass and helps to prevent scouring. If a 1,000lb. cow is able to eat 100 to 140lbs. of grass in the day, she will find sufficient nourishment in that to produce three or four gallons of milk. For very high milk yields, or for the production of extra rich milk, a little cake may be given, especially if the pasture is below average quality. The main point to be noted in this connection is that pasture is the cheapest food from which to produce milk, and that by supplementing it with *purchased* foods the cost of feeding is enormously increased. In a season when grass is scarce, or where the acreage is inadequate for the number of cows, suitable mixtures for supplementing the pasture would be :—(*a*) maize meal 1·4lbs., Bombay cake 1·9lbs., straw-chaff 2·3lbs. ; total 5·6lbs.=1½ food units. (*b*) 12lbs. green lucerne, 2lbs. bruised oats ; total 14lbs.=1½ food units. (*c*) 8½lbs. meadow hay=1½ food units, or one gallon of milk. The change from pasture to house-feeding should be made gradually.

The following points should be noted in feeding :—Provide drinking water in abundance, always fresh, and not too cold. There seems to be no advantage in the cooking of food for cows nor in feeding them on slops; but no food should be given icy cold. See that all food is in good condition. Never use drugs or spices to increase the milk flow. Good wholesome food, especially well-saved meadow hay, is the best spice. Treacle, besides being a wholesome food, is the second best. Supply succulent food all the year round—roots, silage, green crop or pasture; but cows are more easily dried-off on less stimulating food. Give a complex mixture of foods rather than only a few. Mix your own cakes and meals rather than buy compounded cakes. Avoid sudden changes in feeding. The ration should be bulky enough to satisfy the appetite of the cow, and let the cow judge the necessary bulk for herself. The food should be

| FOODSTUFF. | lbs. to make one food unit. | lbs. digestible protein in one unit. | Amount fed: — lbs. per day. |
|---|---|---|---|
| Linseed | 1·31 | ·22 | —½ |
| Decorticated Earthnut Cake | 1·76 | ·70 | 1—2—4 |
| Linseed Cake | 1·88 | ·47 | 1—3 |
| Maize—Mealed | 1·88 | ·13 | 1—2—4 |
| Decorticated Cotton Cake | 1·91 | ·65 | 2—4 |
| Sesame Cake | 1·90 | ·65 | 1—4 |
| Soya Bean Cake | 2·01 | ·68 | 2—4 |
| Cocoanut Cake | 2·06 | ·30 | 2—4 |
| Peas—Mealed | 2·14 | ·36 | 2—4—6 |
| Barley—Crushed | 2·16 | ·15 | 2—4 |
| Beans—Ground | 2·19 | ·42 | 2—4—6 |
| Dredge Corn—Crushed | 2·36 | ·19 | 2—4 |
| Ricemeal | 2·30 | ·14 | 1—3 |
| Palm Kernel Cake | 2·41 | ·30 | 1—2—4 |
| Oats—Bruised | 2·56 | ·22 | 2—4—6 |
| Dried Grains | 3·00 | ·40 | 2—4—6 |
| Broad Bran | 3·26 | ·33 | 3—4—5 |
| Treacle | 3·44 | ·00 | ½—1½—2½ |
| Egyptian Undec. Cotton Cake | 3·59 | ·56 | 2—4—6 |
| Malt Coombs—Steeped | 3·75 | ·43 | 2—4—6 |
| Bombay Undec. Cake | 3·87 | ·54 | 2—4—6 |
| Clover Hay | 4·86 | ·26 | —10—20 |
| Meadow Hay Excellent | 3·85 | ·25 | 10—15—30 |
| Meadow Hay Ordinary | 5·41 | ·23 | |
| Meadow Hay Poor | 8·54 | ·21 | |
| Oat Straw | 9·27 | ·09 | 7—14—21 |
| Draff or Wet Grains | 10·93 | ·41 | 10—20—40 |
| Ordinary Pasture | 13·85 | ·24 | 100—112—140 |
| Green Clover | 15·14 | ·30 | 40—60—100 |
| Green Lucerne | 16·29 | ·32 | 40—60—100 |
| Cabbage | 17·38 | ·26 | 20—40—60 |
| Green Vetches | 19·23 | ·38 | 50—100 |
| Green Oats and Tares | 21·15 | ·30 | 35—70 |
| Swedes | 21·06 | ·08 | 21—42—74 |
| Mangels | 23·02 | ·05 | 23—46—69 |
| Turnips | 31·00 | ·09 | 31—46—62 |

palatable so that the appetite will not be too easily satisfied. The ration should have a slightly laxative effect. Weigh all foods at first and measure them afterwards if preferred. Manure the pastures judiciously and do not allow the grasses to produce flowering heads. Weigh the milk of each cow regularly, get the milk tested for fat periodically, then supply each cow with enough bulk to please her, but with nutrients according to her deserts. Try to estimate the cost of the food of each cow. Weed out, and never breed from cows that fail to pay for their keep.

## III.—FARMER AND FARM LABOURER: A RETROSPECT AND A REVIEW.

*By S. L. Bensusan.*

It was not until the franchise was extended to the waste places of the country-side and the week-end habit had emptied the towns and suburbs of their most energetic dwellers some time between Friday night and Monday morning, that the rural labourer claimed consideration from the rank and file of his fellow countrymen. A few book-lovers knew him before that time, they had met him in the pages of Thomas Hardy, Miss Mitford, Mrs. Gaskell, and some half-forgotten worthies. But rural England was not a popular study and the best book dealing with rural labour in England is written—*horribile dictu*—by a German, Professor Hasbach. Hodge, Giles or Chawbacon, as he was variously called, was popularly supposed to be a sturdy, healthy individual who wore a smock, chewed grass or straw in moments of leisure, kept a pig and even bore a marked resemblance to it. That he was well cared for, well housed and fairly treated, needed no discussion, for the farmer of the popular imagination is and always has been an open-handed, generous, prosperous soul who pays a good rent, rides a fine horse to hounds, lives well and wears gaiters through all his waking hours. The Victorian Punch-artists established the type, and if Nature has not lived up to it, the fault is hers.

That the farm labourer was nowhere like his picture, that the conditions of his life were well-nigh intolerable, that he has had to struggle upward as best he can with little aid, from a slave wage to a living wage, that he is a skilled workman hard to replace and yet rapidly diminishing in numbers—all these things and many others are fairly common knowledge to-day, but little more than twenty years ago, when first I began to enquire into the conditions of agricultural labour, the prevailing ignorance was well-nigh complete and, while few knew that the labourer was badly treated, even these few could not see that the question had a national aspect.

In those days there were plenty of old men still in possession of all their faculties who could tell me of the Repeal of the Corn Laws and the passing of the arable land to pastures on which the line of the furrow may still be traced. There were others who could remember the "Ganger" who brought his mob of men, women and children from farm to farm, to perform the most menial labours, to be ill-fed, ill-paid, and herded together in promiscuity, until at last the scandal grew too unsavoury, even for the rural authorities and dignitaries. There were men who could recall the years when the farmer's labourers received for wages seven shillings a week and small beer, and the times when the foreman of the lonely marsh farms round the coast would drive to the nearest town and buy food from the shops to resell at a profit to the men earning this seven shillings weekly, turning adrift any daring one who was bold enough to resist the imposition, and sending notice to neighbouring farmers not to employ such a desperate character. Those were the days when the farm labourer was warned that he must go to church regularly, and the verger's long pole would find and bruise him if he dared to sleep during the dullest sermon. Work on the land started when a lad could be sent on the land to scare rooks for threepence a week; it ended when the crippled, broken-down survivor of unremitting labour passed to the care of the Master of the Workhouse, to enjoy the tender mercies of Guardians who had forgotten the honourable record of hard work and saw nothing in his poverty but a charge upon the rates that must be kept down to a minimum figure. It is no pleasant picture that must be drawn if we are to deal truly with the agricultural labourer of the nineteenth century. It was painted for me twenty years ago by a dozen or more old men and women, and I noticed how they spoke of their sufferings without self-pity, as though conscious that the Immortals had the right to sport with them. Many were the stories they told me of scanty fare that made them thieves before they were men; the farmer's rabbits, turnips, carrots and potatoes were taken freely in those days, and stood between them and actual starvation. I can recall as I write the old East Anglian farm labourer who summed up the situation in his own clear-headed simple manner. "If so be a man went strite, he most starved or his wife an' children did; if so be he was caught stealin' they sent him to jile, so a sharp man stole an' took good care he weren't caught. I've had hundreds of rabbits in me time an' bushels o' turnips an' sech, but f'r all that I could only rise five children outer eleven. The t'others couldn't thrive on their share o' wittles, so they jest died. Seven shilling ouldn't stretch far enough to cover 'em all, an' though I give up me small beer an' took a extry shillin' instead, that weren't enough."

The enclosure of the common lands, in days when Napoleon's campaigns were taxing the farmer, who said he could not live and thrive unless the yeoman was driven from the land and turned from a free man into a serf, started the monstrous evil that we have only now outgrown or outworn. The fine class of independent men that contrived to do well on the rights of commons and, by simple, frugal living, managed to keep out of debt and enjoy some at least of the leisure or pleasure of life, was deliberately destroyed, and the Small Holdings Act of our time is no more than a belated, and rather muddled, effort to restore to the land a class that should never have been taken from it.

It may seem to us, in the light of our modern knowledge of the land's decline, and with our latter day recognition of the need for giving the labourer a chance in life, quite surprising that the statecraft of our forefathers should have been so short-sighted. The truth is that the whole theory of the relation between labour and wages was false. Edmund Burke could declare in sincerity that it was impossible for free contracts between farmer and labourer to be onerous to either party. He said it was to the farmer's interest that his men should thrive, and that the farm labourer's position was a matter of convention, "dictated by the reciprocal conveniences of the parties and, indeed, by their reciprocal necessities." He continued with an amazing statement. "But, if the farmer is excessively avaricious?—why so much the better; the more he desires to increase his gains, the more interested is he in the good condition of those upon whose labour his gains must principally depend." "Labour," he declared, "is a commodity, and, as such, an article of trade . . . subject to all the laws and principles of trade. When any commodity is carried to market, it is not the necessity of the vendor but the necessity of the purchaser that raises the price. The impossibility of the subsistence of a man who carries his labour to market is totally beside the question. . . . The only question is, what is it worth to the buyer?" These amazing opinions uttered by a conscientious, deep-thinking man reveal the state of mind that was responsible for the condition in which labour was to find itself when, deliberately deprived of independence by the withdrawal of rights of common land, the yeomen of old time, who knew no other trade and had no helpful connections, were compelled to take what wage the farmer was prepared to offer. Many years were needed to deplete the stock of agricultural labourers. The men themselves were slow-witted, and clung to their native parish, always hopeful of the better days they did not live to see. Means of transit were few, they gave hostages to fortune quite early, and with little children round them all efforts at independence became dangerous.

In days before the repeal of the Corn Laws the farmers ruled the countryside with a rod of iron. They established a bare subsistence wage, and if a new comer came into the district they warned him to conform to the rules. If he refused, and I have heard of isolated instances of independence, they undersold and over-bought him in the local markets until he came to heel or left the neighbourhood. It is, I think, an indisputable fact that wages were lowest when the farmers were making most money. They employed nearly twice as many hands as they do to-day and paid half, or less than half, the wages. In addition to this they eyed education, such as it was, askance. A boy ceased to go to school when his labour was worth a halfpenny a day; the generation that was dying out in the nineties could neither read nor write. A few efforts to improve conditions—that of Joseph Arch is the outstanding one—failed; there had been nothing in the labourer's upbringing to promote a collective intelligence, nor did he possess the modest margin above the elementary necessities of life that would enable him to build up a powerful Union through the medium of regular subscriptions. He could not pay an economic rent. The old-fashioned cottage with tiled or thatched roof, dormer windows, quaint porch and gay garden, always so good to look at, often so ill to live in, was his for two or three pounds a year, less than the amount needed annually to keep it in habitable repair. So it was not repaired and slowly but surely it fell into such a state of rottenness that the landlord, faced with the choice of rebuilding or pulling down, chose the latter alternative. In this fashion the problem of overcrowding arrived, and young men and women, finding that they could not marry, went to the towns to find jobs on railway lines and factories and domestic service. Town meant life; they sacrificed exquisite surroundings but earned a living wage; manufacturing England absorbed the rural surplus and, finding the quality good, asked for more. In many parts of England farmers noticed the exodus with dismay but were not in a position to check it; they had combined effectively to suppress labour, they could do nothing to encourage it. The price of corn went down steadily after the Crimean war, until about the early nineties wheat was sold for less than a pound a quarter. Landlords who had bought land when agriculture was flourishing, and had mortgaged their farms as values declined, were saddled with holdings that were worth less than the mortgagees had advanced. Farmers themselves, accustomed through long years of prosperity to take life easily, could no longer strive against the new conditions. In southern England and East Anglia hundreds disappeared, and their places were taken by men from Cornwall and Devonshire, or by Scottish farmers accustomed to the hardest labour and the smallest reward under conditions that made our southern and eastern counties appear mild and equable in point of climate. These men, whatever their holding or their means, worked with their labourers in the fields and kept all their children as busy as themselves. Incidentally they brought some small improvement to the labourer's lot and tried, in vain, to check the exodus from the land. Their failure in this respect was inevitable. The old man whose knowledge of the land was complete would be earning twelve shillings a week by labour in all weathers, and would have no prospect of a rise; his sons would be earning half as much again in London before they were of age. To be sure they paid more for their lodging, but it had conveniences unknown to the country, their food might be adulterated, but it had variety, there was companionship, there were amusements, there was the chance of promotion. The farmers had nothing to offer, had not reached the stage of recognising the necessity or even advisability of offering something. They could not build new cottages or make old ones more habitable, they could not, or would not, revise the wage-list sensibly, for no man had the courage required to face the opposition of his fellows and make a start. They might make minor concessions by carting the men's coal, giving them allotments, supplying seed potatoes, firewood, and odds and ends of the kind, but the labouring man as a class, in the country at least, only appreciates gifts or grants in cash, gifts in kind leave him cold. He simply does not understand them, and what he does not understand he suspects. The sixpence that will buy beer is within his vision, the advice that, if followed, would bring him higher wages, better home, more food, and a little leisure he ignores, but who, remembering his state and his antecedents, will be so foolish as to criticise him harshly? He is what generations of neglect and ill-treatment have made him.

The Established Church ofttimes passed him by. In the old days parsons who rode straight to hounds, and drank more port than was good for them were apt to slip through life without bothering much about their poor parishioners. Their successors proved unable to pick up the lost threads, and their task was made the more difficult by the rise of Nonconformity. It captured the villages in many parts of England, and while the Church appealed to the class that was quite contented with things as they were, the chapel and the meeting house were crowded. The Church, being the more powerful organisation, might have done so much for the agricultural labourer, and, through him, for the countryside, had not the long-extended opportunity been allowed to slip. There is a new movement abroad to-day. Clergymen, in touch with the modern spirit and with modern needs, are making their presence felt, but their task is a hard one, and the old school of thought, that still finds everything right in this best of all possible worlds, has not entirely died out.

Another factor that has had immense effect upon the agricultural problem in these islands is Emigration. Leaving alone the Irish emigration to the United States, we have the vast exodus to Canada and Australia, brought almost to a standstill by the war, but powerful enough in the decade preceding it to carry more than a million British born overseas, to a freer life, better conditions and an atmosphere of equality in which strenuous workers cannot fail to do their best. It is not to the townsman that the Overseas Dominions make their appeal. The man who wears a black coat and drives a pen in city offices is not to their mind. You could not make a pioneer of him without special effort. They want the farm labourer; they will welcome him when all the other avenues of emigration are choked by supplies far in excess of the demand. They will find him a well-paid job, will educate his children and spread opportunities before him with a lavish hand. The healthy, hardworking, skilled, labourer, who sets out with little more than the money to pay his fare across the sea, may hope, as the result of five years' labour for others,—sometimes the period is less—to become his own master, to take a government farm on easy terms and to pay for it as a result of a few successful harvests. For the man with a very little capital a farm is waiting, the house and outbuildings are built, fifty out of one hundred and sixty acres are broken up and planted with corn. He is regarded as an asset, some district is waiting to welcome him with all the gifts of citizenship; in a few years the old life is no more than a strange dream. I have spoken with such men on their holdings in the New World, and they have expressed surprise that any young, enterprising lads just out of their teens remain in rural England.

In Canada alone the land could absorb another ten millions of young men, to say nothing of middle-aged farmers, who boast the experience that helps to replace youthful energy, and such an influx would still leave millions of acres waiting for the plough and spade. In Australia the needs and capacities are not less, nor are the advantages. So keen is the demand for more men that agents from the Dominions are sent in normal times to preach the gospel of emigration to the most remote villages of England and Scotland. They come armed with Government statistics and—still more important—with lantern slides. Though there may be a spice of exaggeration in what they say, the offer is substantially sound. A very small percentage of the emigrants will fail, and returning will speak evil of the land whose potentialities they were unable to grasp, for causes that were generally of their own making; but the great majority succeeds, and in its letters to the old folks at home the Overseas Dominions find their best recruiting force. They are calling to the rising generation and telling it about the prizes that await hard work in a world where land is free and people are helpful and there is room to expand in every direction. Down to the present these agents have had to fight the innate conservatism of the agricultural labourer. The man who has seldom travelled far beyond his own village, and regards those who were not born in it as "foreigners," must summon up a large measure of courage before he is prepared to leave his accustomed haunts. The few shrewd farmers who had troubled to consider the problem believed that this natural hesitation, supplemented by a change for the better in wages and rural housing, might yet save a situation of admitted danger.

They reckoned without the war. What the Overseas Dominions have left the recruiting sergeant has taken. Agricultural labourers by the tens of thousands have renewed the spirit of adventure that made the Empire, they have been drilled into a state of the finest physical efficiency, they have crossed the seas, they have looked with more curiosity than fear into the face of Death, they have mixed freely with men of all classes. A picture of the world has supplanted the picture of the hamlet that enclosed their early lives. They have been fed, as never before, not only physically but mentally, their eyes are opened, they know themselves for men who help to bear the burden of the world's greatest Empire in the hour of its direst need. They will no longer look to the clods at their feet but rather to the skies above them. You may make colonists of these men, you will hardly cast them once again into the old mould. They have gathered the courage to experiment with the life they have risked so freely, and the Dominions Overseas, with their insatiable hunger for humanity, will see to it that the greatest chance of the time does not pass them by. Perhaps the full loss will not be felt for some years. There are still left on the land thousands who lack the spirit of adventure, thousands just past the age of active service, tens of thousands of old men called back to full activity by the clamant message of the times. The old and the middle-aged have their years, but they will pass, and then? The prospect is not an encouraging one to the farmer, the best that can be said for him is that he has time to set his house in order if he will and can. Since the war, he has raised wages—in acknowledgment of wheat prices that recall the Corn Law days—but the rise is nowhere equal to the augmented price of all the necessities of life. The housing problem remains curiously beyond him—I say curiously—because he is often a member of the councils that have power, and might use it in normal times, to build fresh cottages to replace those that have been condemned or pulled down.

Unfortunately the farmer of the old type, in a position of civil responsibility, does not always grasp the truth that a wise expenditure may prove to be a true economy. He understands the requirements of his own fields but not always the public needs of the parish he represents. On the District Councils his aim, speaking generally, is to save the ratepayers' money. Within the limits of his father's horizon, he knows all there is to know about his work, he has mastered the peculiarities, one might almost say the personality, of every field he farms. If he be truly representative of his class it is safe to say he can get better results from his acreage than any other man would be able to do under the same conditions. With this he is content. His view of labour is that the more you pay the less it will respond, that the farm hand, having reached a settled method of living, will always be quite content to earn just as much as will provide it. He will give you instances that justify the charge, quick to forget that the men who have remained behind are not fairly to be regarded as standard types, and that the best men, those who would have welcomed better conditions, are serving the country on other fields than his. He has a vague idea that his men will return with enthusiasm and all will be well. The man, whose wife draws over a pound a week separation allowance for herself and children, is to come gladly back to earn sixteen or seventeen shillings, perhaps less, for corn prices will have fallen, and labour is confidently expected to take what it can get and be glad to be allowed to live in peace and tranquility. It might have been thought that the altered bearing of wounded farm hands who have returned home to complete a cure would have served to dispel such illusions, but it has not done so. Farmers, like many other people who have even less excuse, seem to prefer to hold the views that are the most comforting and not to allow the fair prospects of their industry to be clouded over by troublesome thoughts. In the winter the farmer can thrive short-handed, by the spring he looks for a return to normal conditions. He has done his duty in the war, sending his children and taking no steps to hold back his men, parting with his horses to the Government agents, and quite prepared to meet any further disabilities that his rulers, in their wisdom, may feel impelled to impose, but the worst danger—the loss of his competent and willing workers—has almost escaped him. Can he be sure they will be delighted to return to their crowded cottage, cramped life and inadequate wage?

In the South and East of England, since spring brought such shortage as has been experienced, I have asked several farmers a simple question—"Are you prepared with new conditions for your men"—and when I have been asked to explain what I mean by that, generally in a tone suggesting the impossibility or inadvisability of gilding refined gold and painting lilies, I have mentioned three items. First a living wage suited to the reasonable requirements of a man with a family; secondly, proper accommodation, that is to say room to live in touch with the elementary decencies; and finally some holiday either to be taken on a certain day in each week throughout the year, save at haytime and harvest, or else made up into a week or ten days at some season when the claims of the land are not paramount. There may be those who have thought out such arrangements—it has not been my good fortune to meet one—the mere suggestion has not been well received. Several farmers have told me that such schemes are as unnecessary as they are extravagant, others have pointed out that the position of the men has been so far improved in the past decade that nothing remains to be done. Some have said that the changes proposed would prelude the absolute ruin of farming, two told me that rather than "yield to their men" such preposterous advantages they would prefer to retire from business altogether. Nobody has gone so far as to say that the suggestion is worth considering. Yet it seems to be universally agreed by experts that the labourer cannot support a wife and large family upon a maximum weekly wage of eighteen shillings and that large families are one of the urgent necessities of the immediate future. One is told, too, that the country cannot afford to build cottages, though one day's war expenditure would be more than sufficient to build twenty thousand! The idea of a holiday is scouted; what is deemed essential to the well being of the poorest shop-hand is apparently to be denied to the entire community of agricultural labourers.

Yet, for all the difficulties in the way, one hesitates to despair of the future; in fact, the difficulties do something to clear the ground and show that salvation cannot come from within but must come from without. While the agricultural labourer had no choice, there was none to help him, but, now that the Overseas Dominions are competitors for his services, even the followers of the school of Edmund Burke will admit the necessity for government action if Great Britain is to retain its position as a food producer. Happily, too, Government has seen the need. The Small Holdings Act was designed to make the crooked straight, but it merely increased existing distress because it provided the small man with means to grow crops while leaving him without the means to market them, and, as the capital of five pounds per acre that he was supposed to possess was insufficient to fight against bad seasons and worse markets, the scheme has never succeeded. Small Holdings still exist and some thrive, but the measure of achievement has had no serious effect upon the agricultural problem. Why should a man who has saved fifty or a hundred pounds put it into ten or twenty acres of land, acquired with infinite difficulty over here, when he can turn his capital and labour to so much better uses in Canada or Australia? Nobody who knows the facts would be prepared to deny that the Overseas Dominions can offer him far more for his money.

Doubtless there are several ways in which Government can handle the agricultural problem in order that our national efficiency may tend to increase rather than to diminish. There is the direct action by the State, establishment of a minimum wage, erection of suitable cottages to bring in an economic rent, statutory regulations as to holidays (in the countryside the only holiday that the labourer enjoys at the farmer's expense appears to be Christmas Day). Failing these drastic measures, which are frankly impossible unless and until the Cabinet as a whole realises the urgent need of agricultural reform, the Small Holdings Act can be revised and made workable through the medium of an Agricultural Trust to lend the small holder the machinery he needs and cannot afford to buy, and by the creation of a motor-van service and central depôts that will collect the small man's produce and sell it for him on a small commission. On the other hand, if Government interference is to be active, the farmer must be helped to meet the new charges, not by the establishment of minimum prices for produce, to the detriment of the consumer, but by carrying out on an extended scale the work that is at present necessary in the case of the small holder. If this is not done we shall witness once again the rise of the yeoman class at the expense of the farmer who will remain short of labour. Such a development will hardly respond to the country's needs.

I venture to suggest that the outlook of the agricultural labourer is far brighter than it has been in the lifetime of the present generation and the one that preceded it. The market for the work of his hands is growing, his numbers are at least stationary while in all probability they are declining appreciably, modern and reliable statistics being at the moment hard to obtain. He cannot be replaced; when there was a great rush by willing amateurs to take part in this year's harvest it was not easy to discover farmers who would accept unskilled assistance even at the price of board and lodging. "More trouble than they're worth," was often the verdict, whereas the claim of the old farm hand to be regarded as a skilled labourer is accepted almost before it is advanced. He is likely to have the world to chose from, and he will sell his labour in the best market. The home-farmer may still hold him if he will face the new situation in a wise and generous spirit, such a spirit as the high prices of corn and stock will probably continue to justify for some years to come, and a more scientific method of farming would justify for all time. The labourer has been taught by the war to recognise his own proper value, possibly to over-estimate it, but this fault will right itself. He will have a measure of self-reliance and initiative to which he has hitherto been a stranger. As a class he may be trusted to take the best advantage of a situation that has turned the tide of misfortune that began to submerge him when, in the last great struggle for national existence a hundred years ago, the commons were enclosed and the yeomen dispossessed. Nothing less than this tragic European upheaval would have availed to alter his position so suddenly. Emigration would have done it in time, the pace of progress was steadily increasing, but that was evolution and this is revolution. Under normal conditions there would always have been an inexperienced and timorous residue content to endure the known rather than face the unknown evils. The ranks of agricultural labour have not produced half a dozen great men in a century, the work exhausts the body at the expense of the mind, and it is in teaching the farm hand to think that the drill sergeant has laid the foundations of a peaceful upheaval. Will those who return prove able to instil the spirit of initiative into those they left behind? Will this spirit be strong enough to impose upon farmers as a class a sense of the necessity of putting their house in order? It is dangerous to prophesy, but to those who know the farm labourer and his problems, who recognise his merits as well as his shortcomings, and who feel that the future owes great atonement for the past, the years that directly follow the end of the present war will be as full of interest as of hope.

# IV.—HOUSE-FLIES AND THE PUBLIC HEALTH.

*By Harold Bastin, Author of "British Insects and How to Know Them," etc.*

## HISTORICAL LANDMARKS.

That flies in general, and house-flies in particular, are very inimical to the public health, is a fact that has been recognised by science for many years. It was the late Lord Avebury who referred to flies, in their capacity as disease-spreading agents, as "winged sponges." This was in 1871; and in the same year Leidy declared his belief that flies were responsible for the spread of hospital gangrene and wound infection during the American Civil War. Two years previously (1869), Raimbert had proved experimentally that both the common house-fly and the blow-fly were able to transmit the anthrax bacillus; while in 1880 Laveran was able to show that flies carry, on their proboscides and legs, the infectious discharges of eye diseases. Not until 1898, however, was the appalling truth of the matter driven finally home. The revelation came in the form of a report issued by the highly qualified officers appointed by the United States Government to investigate the prevalence of typhoid fever in the military camps during the Spanish-American War, when one-fifth of the soldiers contracted the disease. As an outcome of their exhaustive inquiry, Drs. Reed, Vaughan and Shakespeare expressed the conviction that house-flies "had inflicted greater loss upon the American soldiers than the arms of Spain had." The chief reasons for this indictment were briefly set forth as follows:

> "(*a*) Flies swarmed over the infected fæcal matter in the pits and then visited and fed upon the food prepared for the soldiers at the mess tents. In some instances where lime had recently been sprinkled over the contents of the pits, flies with their feet whitened with lime were seen walking over the food.

"(*b*) Officers, whose tents were protected by means of screens, suffered proportionately less from typhoid fever than did those whose tents were not so protected.

"(*c*) Typhoid fever gradually disappeared in the fall of 1898, with the approach of cold weather, and the consequent disabling of the fly."

In view of these facts, it is not surprising that the distinguished American entomologist, Dr. Leland O. Howard, should have proposed that the house-fly should be known henceforth as the "typhoid-fly"—not, of course, because it alone is responsible for the spread of this fell disease, but because in its absence the other modes of infection are not difficult to cope with.

Two years later, notwithstanding the terrible warning contained in the above-cited report, the conditions which existed in the United States military camps were reproduced in South Africa, with the result that about 30 per cent. of the deaths which occurred on the British side during the Boer War were due to typhoid fever. All the precautions adopted by the Royal Army Medical Corps to check the spread of disease were defeated by the enormous numbers of flies which swarmed in and about the latrines and mess tents. The flies proved as deadly as the bullets of the enemy.

### TYPHOID "CARRIER CASES."

In the past, outbreaks of typhoid have sometimes occurred in very unexpected circumstances, and experts have completely failed to trace their origin. It is now known that many, if not all, of these mysterious outbreaks have been due to the fact that a person may be capable of distributing the typhoid bacilli for ten or more days before he is laid low by the fever, and that he may continue to do so not only during his convalescence, but also when —to all appearances—he has completely recovered his normal health. Careful investigation of the matter tends to show that these "carrier cases," as they are called, are far more numerous than was at first believed. One such chronic, unrecognised carrier, plus an abundance of house-flies, would be all-sufficient to initiate an epidemic of typhoid which might serve to decimate the population of a town or district in the course of a few months. On the question of typhoid alone, therefore, the Local Government Board had ample justification for the warning that it issued in the Spring of 1915. Nor is typhoid the only danger, for flies are either known or suspected disseminators of many other evils, including infantile diarrhœa, tuberculosis, ophthalmia, anthrax, cholera, plague, leprosy and small-pox.

## HOW FLIES SPREAD DISEASES.

The peculiar deadliness of house-flies consists in the dual activities of each individual insect, and its consequent change of habit. The grubs or maggots feed upon moist refuse of many kinds, but particularly upon stercoraceous matter. Hence the adult female flies constantly resort to such places as latrines and manure heaps in order to lay their eggs. Neglected middens are also fruitful nurseries for the pests. From these filthy breeding grounds the insects often fly straight to our shops, dairies, larders and dining-rooms. That they carry among the hairs of their legs and bodies germs of many kinds has been abundantly proved by experiment. But this mechanical transport is only one (probably the least effective) of the ways in which flies spread diseases. They greedily absorb as food the most filthy liquids, and in this way their excreta —the all-too-familiar "fly blows" or "fly spots"—are rendered infective. Furthermore, the food absorbed by the fly passes first into a crop, which (to quote Dr. C. G. Hewitt) "calls to mind the functions of the storage stomach of the ruminating animal, which enables such an animal as the cow to obtain a considerable quantity of food, which it may afterwards regurgitate and chew at its leisure and when undisturbed. Very frequently the fly regurgitates its food from the crop in the form of large drops of fluid. . . . . In some cases these regurgitated drops are deposited as "vomit" spots on the surface upon which the fly is resting."* Facts such as these make disgusting reading, especially when we are told that these vomit spots are not infrequently left upon food which is subsequently served at our tables. At the same time, their bearing upon the health of the community is of such vital importance that they cannot be too plainly stated, or too widely known.

## WHAT IS A FLY ?

The term "fly," as used by the general public, is probably the most widely comprehensive word in the English language. It is applied indiscriminately to some hundreds of small winged creatures that are found, more or less frequently as the case may be, within the walls of our houses ; it is commonly used by farmers, gardeners, and others to designate agricultural pests of many and diverse kinds ; while if, in the course of a country ramble, we suffer inconvenience from the presence of a small insect beneath the eye-lid, we invariably refer to the intruder as a "fly," although usually—perhaps as often as nine times out of ten—it will prove upon expert examination to be a beetle! Now this amiable vagueness with regard to the correct classification of natural objects, although characteristically British, must be regarded as a national shortcoming. "It is by just this contempt for accuracy and of close scientific investigation on our part (wrote Sir Harry Johnston recently) and by the opposite characteristics amongst the professional, administrative, and commercial circles in Germany that Germany has so often got ahead of us in the world's commerce and industry." It will be wise, therefore, to devote a paragraph or two to definitions before proceeding farther with our subject.

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* "House-Flies and How they Spread Disease." C. G. Hewitt, Cambridge University Press.

Flies, as the word is interpreted by the entomologist, constitute a distinct group or order of insects whose members differ from those of all the other orders in having the hind-wings reduced to tiny stalked knobs, called balancers or halteres—the forewings alone being serviceable for flight. For this reason flies are known collectively as Diptera—*i.e.*, "two-winged." The functional wings are usually transparent, and are supported by not more than seven longitudinal "veins" or nervures. Flies, moreover, have no biting jaws such as are characteristic of many other insect types. On the contrary, their mouth-parts, when present, serve either for piercing and sucking, or for sucking only. Gnats or mosquitoes, for example, have no less than six needle-like stabbing instruments that are believed, with good reason, to represent the greatly modified mandibles, first maxillæ, labrum and "tongue" of a typical biting insect such as a cockroach or a grasshopper. All the six needles lie normally within a grooved sheath—the modified second maxillæ, or labium. When a gnat "bites" us, the needles are driven through the skin, while the sheath loops back under the insect's head. The extreme tip of the sheath, however, remains closely pressed to the skin, and continues to surround the needles, which it presumably guides and steadies. The actual sucking tube, through which blood is drawn into the mouth, is believed to consist of the labrum and tongue in conjunction—the four needles which represent the mandibles and maxillæ being chiefly employed to enlarge the wound. In the gad-flies (also called breeze-flies), the six piercing mouth-parts, as enumerated above, are all well developed; but although, when not in use, they are still enwrapped by the labium, the latter is now far more than a mere sheath, being, in fact, an elaborately contrived fleshy proboscis by means of which fluids may be absorbed into the mouth. Thus, these insects possess a suctorial apparatus which is quite distinct from the piercing mouth-parts, and capable of separate use. It is this organ—the proboscis or modified labium, often but incorrectly referred to as the " tongue " —which becomes the sole food-getting appliance in those very numerous flies whose piercing mouth-parts have become obsolete. In a subsequent paragraph we shall refer to the structure and mode of use of a house-fly's proboscis. For the moment, we need only emphasize the fact that the organ is incapable of wounding or puncturing the cuticles of animals or plants. The common house-fly, and many other species whose mouth-parts are exclusively suctorial, often annoy men and animals by creeping over exposed areas of the skin, or congregating about the eyes or nostrils. Their object, however, is to mop up the natural excretions of the body—whence their popular name of " sweat flies." Unlike mosquitoes, tse-tse flies, and other blood-sucking species, they are unable to inoculate their victims with the germs of disease.

## WHAT IS A HOUSE-FLY ?

Generally speaking, therefore, we may say that a true fly may be known by the character of its wings and mouth-parts, although we must not press the definition too far, since there are a few wingless flies, and some that are practically without mouth-parts. As to the question, What is a house-fly ? one might answer :—A fly that frequents houses, and thereby lump together at least a score of different kinds. This, of course, is actually done by the uninitiated. There are, however, two particularly abundant species to which the term " house-flies " is usually restricted by science. These are the common house-fly (*Musca domestica*) and the lesser house-fly (*Fannia canicularis*). As a rule, the latter is far less numerous in human habitations than the former, but it makes its appearance earlier in the season, and is really *the* house-fly throughout May and June, and, in a tardy summer, sometimes well into July. On the other hand, when once the common house-fly " gets going," it soon justifies the distinctive prefix to its name. In a collection of flies made by Dr. Howard in Washington, U.S.A., in rooms where food was exposed, 98·8 per cent. of the whole number proved to be *Musca domestica*, while the same species figured to the extent of 87·5 per cent. in a collection made in Manchester by Dr. Hewitt. In this latter case, the percentage of *Fannia canicularis* was 11·5. While, therefore, the habits of the lesser house-fly are on the whole similar to those of the larger species, its numerical inferiority renders it less important from the hygienic standpoint, and the efforts of " kill-that-fly " campaigners are thus chiefly directed against *Musca domestica*.

## THE FLY'S BREEDING HABITS.

The common house-fly, like the majority of other insects, undergoes a "complete metamorphosis" in the course of its development. In other words, its life-cycle comprises four distinct and well-marked stages, viz., the egg, the larva, the pupa and the perfect insect or imago. The pearly white eggs are cylindrically oblong (they have been aptly described as "banana-shaped") and have two rib-like thickenings along the side. (Fig. 1.) From 100 to 150 are usually laid at one time, and a single female fly is capable of depositing five or six such batches (possibly more) during her life. The eggs are usually laid, by means of the fly's extensile ovipositor, in a dark crevice of the substance upon which the larvæ are destined to feed. This substance is preferably stable manure, but in its absence flies have been found to resort for egg-laying to organic matter of many kinds, and given the necessary warmth and moisture the maggots appear to thrive perfectly well. Dr. Hewitt give the following classified list of substances in which the common house-fly has been observed to breed :—

### EXCREMENTOUS.

Horse-manure.
Human excrement.
Cow-manure.
Fowl excrement.
Pig-manure.
Rabbit-manure.

### VEGETABLE.

Spent hops.
Decaying grain.
Cooked peas.
Rotten water melon.
  ,, mush or other melons.
  ,, cucumber.
  ,, carrots.
  ,, cabbage.
  ,, potato and peelings.
Boiled rice.
Barley malt.
Excreta-soiled straw.
Bread or cake.
Bread and milk.
Rotten apricots.
  ,, bananas
  ,, cherries.
  ,, plums.
  ,, peaches.

### ANIMAL MATTER.

Rotten meat.
Carrion.
Cattle paunch-contents.
Rotten fowl feathers.
Old broth.
Boiled eggs.

### MISCELLANEOUS.

Kitchen refuse.
Fermenting substances in ashpits.
Sawdust and excrementous refuse.
Garbage pile drainage.
Cesspool.
Snuff
Expectoration with earth.
Excreta-soiled paper, rags.
Ensilage.
Rubber.

After studying such a list, it is clear, as the authority in question remarks, "that wherever there are collections of manure, or excrement, or of waste animal or vegetable substances collectively known as garbage, house-flies are liable to breed on the occurrence of a suitable temperature."

## THE HOUSE-FLY'S LARVA.

The larva or maggot (Fig. 2) of the common house-fly tapers gradually off from the middle to the anterior extremity, where it ends in two oral lobes, between which a black mouth-hook protrudes. The tiny head is withdrawn completely into the anterior end, and in consequence is not visible. The larva uses its mouth-hook for tearing up its food, which is absorbed in a semi-liquid state; also (when creeping) as a kind of grappling-iron. By means of the roughened "locomotory pads" on its ventral side, and of its mouth-hook, the larva can move fairly quickly either backwards or forwards. The body of the larva appears to consist of twelve segments, but in reality there are thirteen, the second segment proving upon dissection to be of a dual nature. At the sides of this segment there is a pair of fan-shaped organs—the anterior spiracles—through which air is admitted to the respiratory tubes (or tracheæ) of the larva. A second, much larger pair of spiracles is found at the blunt posterior extremity. In the adult fly, as in the majority of insects, the spiracles are more numerous, and are situated at the sides of the body; but such an arrangement would probably prove highly inconvenient to an animal destined to dwell in moist filth—if, indeed, it did not lead to the creature's speedy death by suffocation.

The foregoing description will be found to apply to a very large number of Dipterous larvæ. But the larva of the house-fly may be distinguished from that of most other species by the deeply sinuous air-clefts, or slits, in the posterior spiracles. Microscopic examination is necessary if the point is to be satisfactorily settled.

## THE PUPARIUM.

When the larva has completed its feeding, it usually seeks some dry and sheltered crevice, where it rests for a short time prior to assuming the pupal state. This change is not preceded by a complete casting off of the last larval skin, as is the case in the metamorphosis of a butterfly or a beetle. On the contrary, the larval skin contracts and hardens, and in the course of a few hours becomes the reddish-brown, barrel-shaped case, or puparium (Fig. 3), in which the pupa is formed. The locomotory pads and the spiracles of the larva may still be recognised in the puparium, but they are now functionless. Breathing is effected through an inconspicuous pore situated at the juncture of the fourth and fifth segments, on the dorsal side. Within the puparium a marvellous transformation is accomplished. The organs of the larva are gradually effaced, and those of the adult fly are built up. Thus, to quote Dr. Hewitt, " from a footless, headless and light-shunning maggot living in the worst of filth is developed a vivacious, sun-loving aerial insect, an unbidden guest at the rich man's table."

## THE ADULT HOUSE-FLY.

The perfect fly (Figs. 4 and 5) emerges from the puparium by pushing off the anterior end. In this operation it is assisted by a curious balloon-like contrivance, termed the ptilium, or frontal sac. At the time of emergence this is inflated, and serves to split the cap, or anterior end, of the puparium into two parts. Subsequently, the frontal sac is withdrawn into the head, and is not again used. As in all insects, the body of the adult fly is divided into three well-defined parts, viz., the head, the thorax, and the abdomen. Notable features of the head are the pair of large compound eyes, the three simple eyes on the brow, and the three-jointed, club-shaped antennæ, each of which bears a feathery plume—the arista. The lower part of the head carries the extensile proboscis, which is flanked by the palpi—two " feelers " whose function is, perhaps, olfactory in part. To the thorax are attached the three pairs of legs and the one pair of functional wings ; also the pair of abortive hind-wings or halteres. These latter are placed beneath a pair of membraneous hoods, called squamæ.

The back of the common house-fly's thorax is mouse-grey in colour, marked sometimes distinctly, sometimes indistinctly, with four longitudinal black stripes. The colour and markings of the abdomen are more variable, but the sides are more or less buff in the male, and frequently in the female also. The sexes may be most readily distinguished, however, by the width of the space between the large compound eyes when the specimen is viewed from above. This space in the male is scarcely one-fifth of the diameter of the whole head. In the female the proportion is nearly one-third. It may be added that the usual length of the house-fly is about a quarter of an inch, although individuals vary in size, no doubt in accordance with the kind and amount of food consumed by the developing larvæ. But it is not to be supposed that the smaller flies grow into large ones, for among insects no further growth takes place when once the adult, or perfect, stage of the metamorphosis is attained.

## HOW A FLY FEEDS.

In the house-fly and its near relatives, the suctorial proboscis, which is characteristic of so many Diptera, reaches its highest development. When not in use, this organ bends back upon itself, much as a man's arm bends at the elbow when he brings his fist to his shoulder. In this position it lies in a depression beneath the head. Dr. Hewitt has shown that it is protruded by the combined action of the air-sacs in the fly's head, and its blood—a sudden expansion of the air-sacs forcing the blood (which, in insects, is not confined to blood-vessels) into the proboscis, which " is thereby extended, as one may extend the finger of a glove by blowing into it."

The proboscis ends in two fleshy lobes, which when not in use are folded together like the valves of a mussel. When expanded, they can be pressed very closely upon any object, owing to their soft, yielding nature. Each lobe is traversed on the underside by upwards of thirty channels which act as tributaries to larger channels that are situated on the inner edges of the lobes. These main channels open into the mouth, whence a still larger grooved channel communicates with a powerful muscular pump (the pharyngeal pump) into which the liquid food is sucked up. The sixty odd channels of the lobes are really inverted gutters, each being open to the air on the underside of the lobe, and supported inwardly by a close-set series of incomplete rings, or arches, or chitin.* The salivary glands of the fly, of which there are two pairs, are exceptionally large, and the flow of saliva is proportionately copious. Thus, when the insect desires to avail itself of some solid food, such as sugar, it applies the lobes of its proboscis to the substance, floods the channels with saliva, and then pumps back the liquid, which now carries sugar in solution. It is not difficult to realies that this uncleanly way of feeding, together with the fly's habit of constant regurgitation already mentioned, affords ample scope for the dissemination of disease germs.

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* Chitin is a peculiar, non-living substance, horn-like in appearance but chemically quite distinct from horn. It is very commonly excreted by the epidermal cells of insects.

## RATE OF INCREASE.

The common house-fly requires a fairly high temperature (about 25° to 30° C.) for its successful development. In ordinary seasons it begins to breed in June and July, and continues until October, but it multiplies most rapidly during the months of August and September. Experiment has shown that in favourable circumstances the complete development, from egg to perfect insect, may be accomplished in about nine or ten days. In from ten to fourteen days later the flies become sexually mature, and four days after mating the females are ready to lay eggs. Thus, it is possible for the eggs of the second generation of flies to be laid rather more than three weeks after the deposition of the first eggs. "With these facts in mind (writes Dr. Hewitt) the astonishing fecundity of this insect will be readily appreciated, and the enormous numbers of flies which succeed hot spells of weather will not be a matter of so surprising a character." In another place, the same authority states that it has been calculated that "if the progeny of a single pair of flies, assuming that they all lived, were pressed together at the end of the summer, they would occupy a space of about a quarter of a million cubic feet."

## WHAT HAPPENS IN WINTER ?

At the approach of winter, the majority of house-flies die of old age or disease. But in sheltered situations where the temperature is kept relatively high—*e.g.*, in such places as kitchens and bakehouses, or in well-warmed houses—a few flies may be found occasionally during the whole period extending from late autumn to early spring. Moreover, flies have been known to breed during the winter months when local conditions have been exceptionally favourable. It is very questionable, however, whether a sufficient number of flies is maintained in these ways to account for the rapid multiplication of the species which marks the return of summer. Until recently, it was supposed that a certain number of young flies—that is to say, flies newly emerged from their puparia—were accustomed to hibernate in suitable dry crevices, both within and out of doors, and that in this manner the persistence of the species was secured. But this view has not been corroborated by the researches undertaken by Dr. Monckton Copeman and Captain E. E. Austin, on behalf of the Local Government Board. Situations such as competent observers had found to be favoured by hibernating flies were investigated, and flies were found—but they were not house-flies. Indeed "the results obtained afford no support to the belief that house-flies hibernate, in this country, in the adult state; and the problem as to the manner in which the interval between one fly-season and the next is bridged over still remains unsolved."*

## THE LESSER HOUSE-FLY.

We turn now to the lesser house-fly (*Fannia canicularis*). (Fig. 6.) It belongs to a distinct family (*Anthomyidæ*) from that (*Muscidæ*) which includes the common house-fly. The back of the thorax is marked, more plainly in the female than in the male, with three dark, longitudinal stripes—not with four, as is the case with *Musca domestica.* Moreover, in the male, the three or four basal segments of the abdomen have each a pair of yellow translucent spots at the sides, while the face of this sex is conspicuously silvery-white.

It is worth noting that, in the common house-fly, the so-called fourth longitudinal vein of the wing, near the tip, is sharply elbowed in such a way that it ends almost in contact with the vein in front of it when the margin of the wing is reached. This sharp elbowing of the fourth vein is characteristic of many other flies—for example, the blue-bottles and green-bottles; but it is not found in any house-frequenting species that would be easily mistaken for *Musca domestica.* In the lesser house-fly, the vein is not sharply bent, but relatively straight—this straight fourth vein being characteristic of all the *Anthomyidæ*, and of some other flies as well.

Although the breeding habits of *Fannia canicularis* are, on the whole, similar to those of the common house-fly, its larvæ are very different in appearance. They are somewhat flattened, broadest in the middle, and have rows of spiny processes along the back and sides, (Fig. 7.) To these processes, fragments of the substance in which the larva is feeding adhere, so that the creature has normally a very dirty and uncouth appearance. Its length, when full grown, is slightly less than a quarter of an inch. According to Hewitt, the larval life may vary from one to several weeks, presumably in accordance with the conditions of temperature and food-supply. Two or three weeks are spent in the pupal state. (Fig. 8.)

## OTHER FLIES FOUND IN HOUSES.

Besides the two species described above, many other flies are found more or less commonly in houses. Several of these call for brief mention, since they are liable to prejudice the health of the community.

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* Report of the Local Government Board, New Series, No. 102.

The species commonly known as the latrine-fly (*Fannia scalaris*) is closely related to the lesser house-fly, from which it is scarcely distinguishable by the novice. It is probably commoner than its congener, although it is far less prone to enter houses. Nevertheless, its usual breeding habits, as indicated by its popular name, are such as to render it a likely carrier of typhoid and other diseases. Its larva resembles that of the lesser house-fly in general appearance, but the spiny processes are feather-like in character, and were formerly mistaken for gills. In passing, it may be stated that the larvæ of the common house-fly, the lesser house-fly, the latrine-fly, and the common blue-bottle (*Calliphora erythrocephala*) are those most usually responsible for the condition known as myasis.

The stable-fly (*Stomoxys calcitrans*) (Fig. 9) is presumably the insect responsible for the old saying that " flies begin to bite before rain." It is really an out-door fly, but it is apt to enter houses, occasionally in considerable numbers, especially when a storm threatens. It is one of the very few Muscid flies capable of drawing blood, and to the superficial glance it is not unlike the common house-fly. Hence, when undiscriminating humanity feels the prick of its proboscis, the house-fly is liable to be blamed. A detailed comparison of the two species would render such mistakes impossible. In the first place, the stable-fly's stiff, awl-like proboscis, adapted for piercing and sucking, is not likely to be overlooked, as it always projects horizontally forward from beneath the head. Then, again, the fourth longitudinal vein of the wing is far less sharply elbowed than is the case with the house-fly, while there are no buff patches on the sides of the abdomen. Generally speaking, the stable-fly may be described as a distinctly larger and more robust insect than *Musca domestica*; moreover, it is more boldly marked and spotted.

The stable-fly's larva is very similar to that of the common house-fly, except that it has a somewhat more shiny and translucent appearance. It is most satisfactorily distinguished, however, by an examination of the posterior breathing spiracles—for which purpose a microscope is necessary. This insect appears to be less prolific than the house-fly. It breeds readily in decaying vegetable matter, and has also been reared from the excrements of various domestic animals. Hewitt states that because of its different feeding habits in the adult state it is less liable than the house-fly to frequent substances which contain disease-causing bacilli, and is thus, probably, not a serious offender against the public health. He adds, however, that "its blood-sucking habits may be responsible for the occasional transfer of the germs of anthrax from cattle to man, giving rise thereby to malignant pustule or other bacillary disorders."

*Muscina stabulans*, for which no popular name appears to exist, is very similar in general colouring to the common house-fly, with which it is easily confused, unless a close examination be made. It is usually larger than any of the flies mentioned above (except, of course, the blue-bottle), while a part of each leg is more or less distinctly tinged with cinnamon colour. Furthermore, the fourth longitudinal vein of the wing is not elbowed, although it bends slightly towards the end of the vein which precedes it. In the larval state, this insect is known to feed on a variety of substances, including refuse and excrement, although it seems to favour a vegetable diet. Since its habits resemble, on the whole, those of the common house-fly, its presence in our dwelling-places—where, like the lesser house-fly, it appears early in the season—should not be tolerated. *Pollenia rudis*, known popularly as the "cluster-fly," because it is sometimes found clustered together in large numbers, is another species that is confused with the common house-fly by the casual observer. But it is slower in flight than the latter; and is also darker in colour, with a yellowish tinge. It is sometimes numerous in houses, especially in spring and autumn, but since its breeding habits are imperfectly known, its precise economic status cannot at present be gauged.

## THE CHEESE-FLY.

Although the cheese-fly (*Piophila casei*) (Fig. 10) is rarely seen in the modern town house, it is often very abundant in and about rooms devoted to the storage of cheese, bacon, etc. As it probably plays a part in the bacterial pollution of food and milk,* a brief outline of its life-history may not be out of place. Its larva, or maggot, is the well-known "cheese skipper," which can jump to a height of three or four inches, although it is only one-fifth of an inch long. This feat is accomplished by first bending the body in a loop, so that the two ends almost meet, and then straightening it out with spring-like suddenness. The eggs are laid in cracks or cavities of cheese, bacon, and hams, the outer, fatty parts of the latter being especially liable to attack. The maggots hatch in about a couple of days, and if food be plentiful, and the weather warm, they continue to feed for about a fortnight—though the time may be considerably extended if the conditions for growth and development are unfavourable. The pupal stage usually occupies 10 days : so that the whole life-cycle, if passed through without delays, is accomplished in a little over three weeks. Each female cheese-fly is believed to lay about 30 eggs, and there are at least three broods of the pest in the year. The maggot conforms to the type that has already been described, being blunted at the posterior extremity, and tapering towards the head-end. The posterior spiracles project considerably from the surface of the body. The cheese-fly, which is placed by systematists in the family *Sepsidæ*, is a tiny, shining black insect with transparent wings. Its average length is three-twentieths of an inch.

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* For an account of flies in relation to milk see "Lloyd on Observations on Cheddar Cheese-Making." "Journal of Bath and West and Southern Counties Society." Vol. IV. Fourth Series.

### BLOW-FLIES AND FLESH-FLIFS.

A few words must be added concerning blow-flies and flesh-flies—popular terms which cover at least four species that are often seen in and about human dwellings. Two of these are " blue-bottles," viz., *Calliphora erythrocephala* and *C. vomitoria*—the former being the more common, while the latter rarely enters houses except to lay eggs. The common " green-bottle " is *Lucilia caesar*. Everyone knows that these flies lay their eggs upon meat, especially if it be slightly tainted. They are exceedingly prolific ; and the fact that the adult insects are attracted by all manner of filth and rottenness is at least circumstantial evidence that they are concerned in the dissemination of disease—although exact data as to their misdeeds are not yet available. Finally, there is the grey flesh-fly (*Sarcophaga carnaria*), which frequently enters houses in search of filth and carrion on which to deposit its minute, living maggots—for this species, exceptionally, is viviparous. It is stated that one female is capable of giving birth to 20,000 young ! If these blow-flies and flesh-flies are to be kept at bay, all meat must be protected by gauze coverings of very fine mesh, for Fabre has shown that the grey flesh-fly will drop her grubs from a considerable height on to the food below if she can discover an opening of sufficient size. Probably the blow-flies will do the same with their eggs, though this does not seem to have been actually observed.

### NATURAL ENEMIES OF FLIES.

Before considering the preventive and remedial measures that may be put into force against house-flies, we may glance at the natural enemies of which these insects are the victims. Among these must be reckoned several parasitic and predacious insects—wasps, in particular, being useful members of the latter group. Spiders also are great slayers of flies, as everyone knows ; and it is a discreditable reflection upon the acumen of the average British housewife that she is—or, at least, has been until quite recently—comparatively tolerant of flies, yet vigilant to give all spiders a short shrift. Frogs, toads, and some wild birds destroy a certain number of flies each season, while domestic poultry greedily devour the maggots, and may thus with advantage be given the run of stables, cow-houses, yards, refuse-heaps and other places where material likely to attract flies is liable to accumulate.

Attached to the bodies of house-flies, one frequently finds small mites (or *Acari*) of several kinds, also tiny, lobster-like creatures known as false-scorpions, or chelifers. Whether the chelifer is really parasitic to any extent upon the fly, or whether it merely takes " free rides " upon it from one situation to another, are at present moot points. But some of the mites are known to suck the fly's juices, and may conceivably serve to shorten its life. Other mites, however, treat flies only as convenient transporting agents which serve to convey them rapidly from the comparative paucity of the rubbish heap to the amplitude of the larder or cheese-room. There can be no doubt that the infestation of food, etc., by mites is often brought about in this manner.

Other natural enemies of the house-fly are a microscopic unicellular parasite, and a thread-worm, or Nematode worm, known as *Habronema muscæ*. It has been found recently (by Ransom in 1911) that two hosts are necessary for the complete life-cycle of the latter parasite—viz., the fly and the horse. To what extent these parasites affect the vitality of flies is not stated.

## THE FLY FUNGUS.

There can be little doubt that the most effective natural enemy of the house-fly is a parasitic fungus, known as *Empusa muscæ*, which destroys large numbers of these insects every autumn. The victims may frequently be observed attached in more or less lifelike attitudes to walls and window-panes, and in the latter case it is easy to see the white spores of the fungus scattered round the dead insect. (Fig. 11). The spores are discharged to a considerable distance from the body—in some instances two and four-fifth inches, according to Mr. H. T. Güssow, although about three-quarters of an inch would appear to be the usual limit. Until quite recently, it was believed that the spores settled by some means or other upon healthy flies, whose bodies they subsequently penetrated by small filaments, or hyphæ. The experiments of Mr. Edgar Hesse, however, appear to have proved beyond quibble that the fly absorbs the spores with its food, and that they thereafter germinate in the crop, from which the fungal threads ramify throughout the body, and gradually destroy all the tissues and organs. Death appears to take place about twelve days after infection. Another mystery that Mr. Hesse has been able to solve, at least in part, is that which formerly surrounded the life-cycle of the *Empusa* fungus, and in particular the manner in which it survives the winter, when flies practically disappear. In 1912, he succeeded in obtaining an artificial culture, and in subsequent experiments he was struck by the fact that as many as three different forms of fungus were frequently produced from spores obtained from infested flies. One of these forms, known to science as *Mucor racemosus*, was so persistently present in the cultures that Mr. Hesse was led to think that it might be a saprophytic stage in the life-cycle of the *Empusa* which enabled the fungus to persist from season to season. Subsequent investigations, for the maintenance of which a grant was made by the Local Government Board, have served to demonstrate the correctness of this theory. The *Mucor* is readily cultivated on egg-yolk, and when its spores (mixed with a sterilised syrup of sugar and water) are absorbed by house-flies, the insects die in due course, and show the usual appearance of infestation by *Empusa mucsæ*. The deadliness of the parasite is very limited in range. So far as is known, only the common house-fly and the lesser house-fly are attacked by it—even the blue-bottle escaping. On the other hand, the larvæ of house-flies are readily destroyed by spraying the manure or other refuse in which they are feeding with a spore containing liquid. In laboratory experiments, manure in which larvæ were feeding was sprinkled with the preparation, and in no instance did any insect reach maturity. To sum up, Mr. Hesse has succeeded in establishing the following points: viz., (1) That it is possible to attack flies with the artificially cultivated spores of the specific fungus-parasite which kills them; (2) that the spores can be used with effect upon the larvæ in their breeding-places; (3) that the spores are harmless to all life except that of the fly; (4) that the spores can be easily and economically produced—one tablespoonful of the medium, when properly used, yielding enough spores for one gallon of syrup; (5) that the spores can be kept ready for use in the syrup for an indefinite period; (6) that the spore-containing syrup can be coated upon paper, and thus conveniently exposed in any room or workship where flies are numerous.

The chief drawback in the past to the usefulness of *Empusa muscæ* as a fly-destroying agent has been its late appearance on the scene. Under natural conditions, it is rarely noticed before the

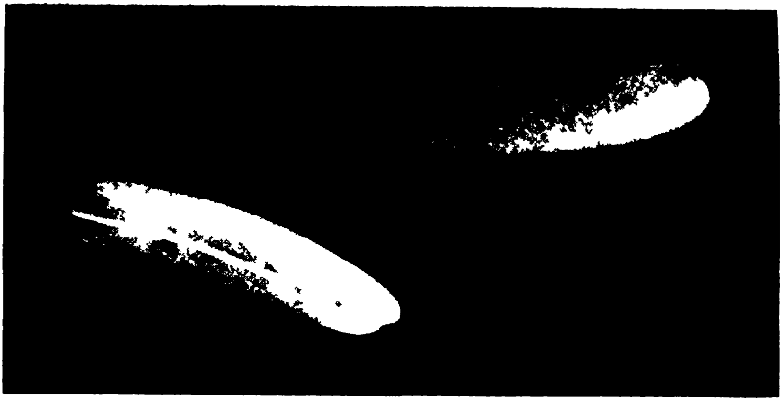

Fig. 1.—Eggs of *Musca domestica*
(Enormously magnified.)

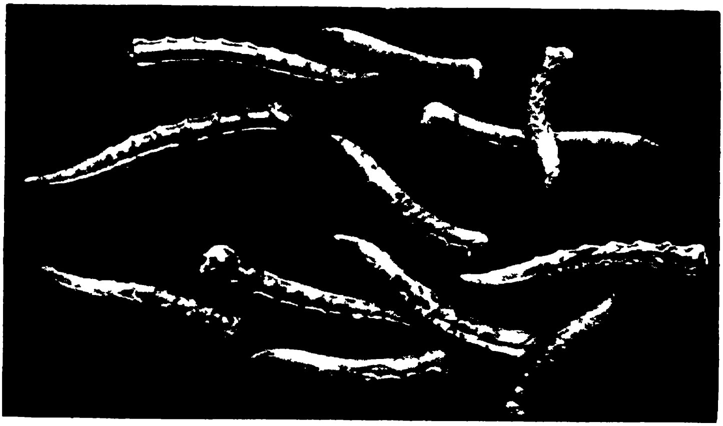

Fig. 2.—Larvae of *Musca domestica*

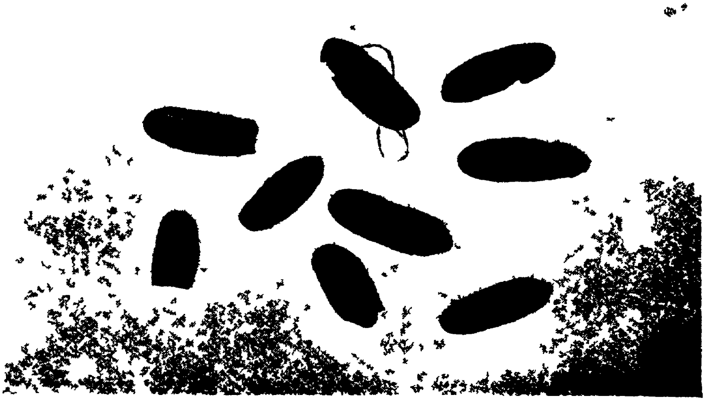

Fig. 3.—Puparia of *Musca domestica*

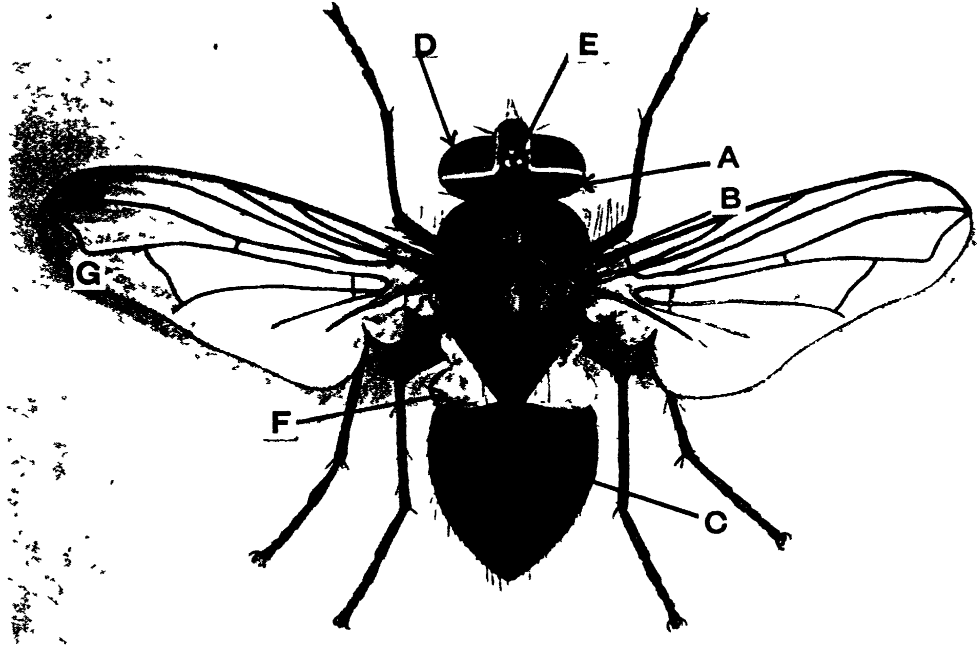

Fig. 4.—*Musca domestica*. (From a model.)

A. Head
B. Thorax
C. Abdomen
D. Compound eye
E. Simple eye
F. Squamæ
G. Elbowed Vein

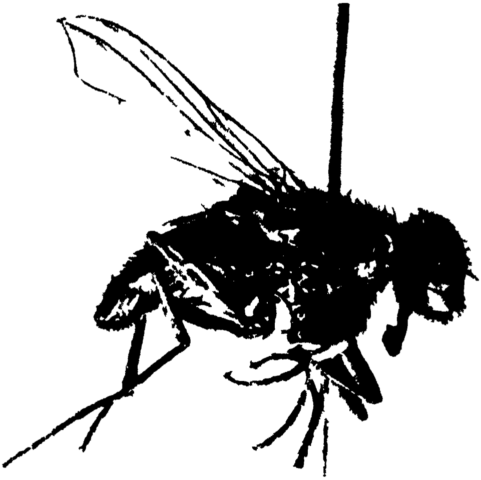

Fig. 5. Common House Fly
*(Musca domestica)*
From side

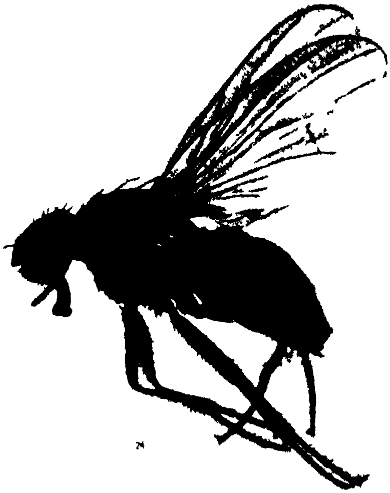

Fig. 6. Lesser House Fly
*(Fannia canicularis)*
From Side

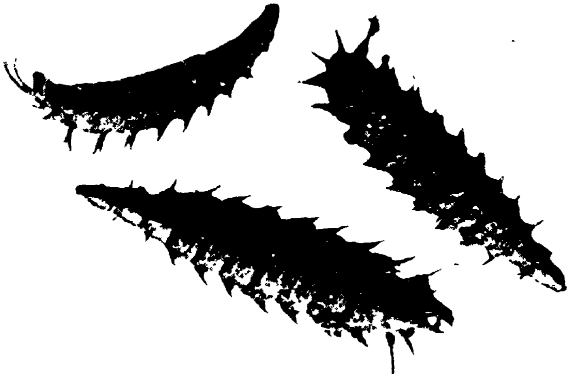

Fig. 7 Larvæ of *Fannia canicularis* (considerably enlarged.)

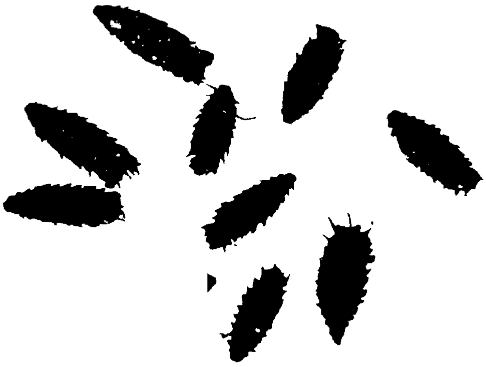

Fig. 8.—Puparia of *Fannia canicularis.*

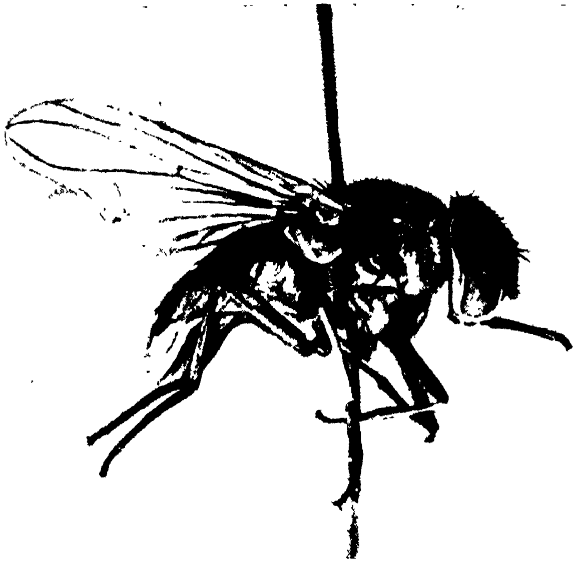

Fig. 9. STABLE FLY (*Stomoxys calcitrans*). From side.

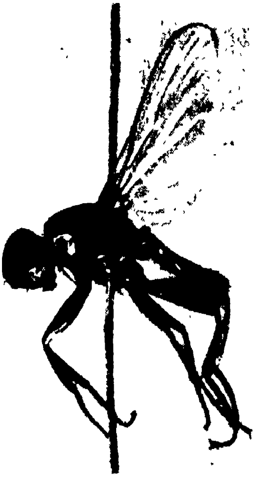

Fig. 10. CHEESE-FLY (*Piophila casei*). From Side.

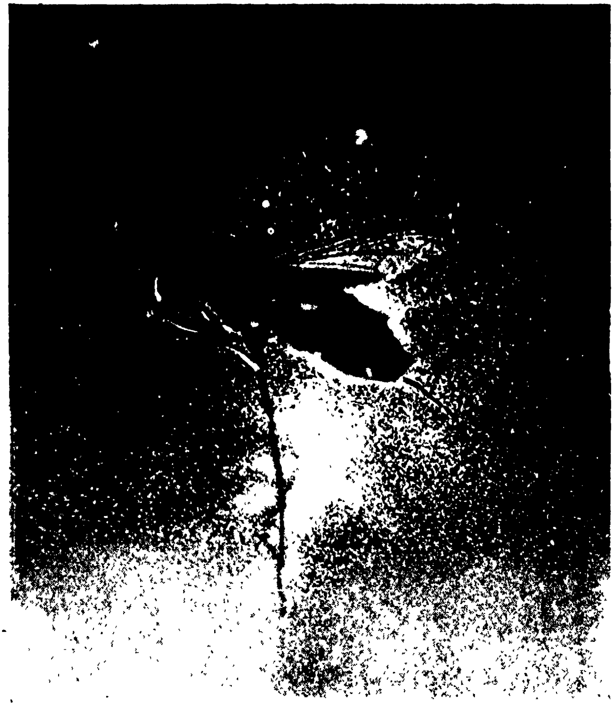

Fig. 11. Fly killed by a fungus (*Empusa muscæ*).

beginning of July, while the mortality caused by it does not reach its height until the late autumn. Seeing that it is now possible to infect earlier broods of flies, the fungus is likely to prove far more destructive in the near future. Mr. Hesse has completed the experiments undertaken on behalf of the Local Government Board. He is informed that it is not within the province of the Board to produce material, etc., for distribution; so that this matter must be left to private enterprise, unless the Sanitary Section of the Royal Army Medical Corps should decide to take it up.

## Preventive and Remedial Measures.

Established facts concerning the disease-spreading potentialities of the house-fly afford ample support to the view, now held almost universally, that under modern conditions this insect—except as a danger signal—serves no useful purpose whatsoever. It is sometimes urged that the maggots of flies are efficient scavengers—that they perform good service by eating up organic refuse. The obvious retort is that if organic refuse were never allowed to accumulate in an insanitary manner, then no maggots would be needed. Nor is this complete and rapid disposal of all unwholesome or infective matter an unattainable ideal. All that is needed for its accomplishment is intelligent action on the part of public health authorities, coupled with intelligent co-operation by the general public.

To prevent flies from breeding must clearly be the first consideration in every campaign against these pests. The chief breeding places being heaps of horse manure and stable refuse, temporary accumulations of this sort should be kept, whenever possible, in fly-proof receptacles or pits. This should be made imperative within the areas of cities and large towns, where, moreover, the regulations governing the building of stables should provide that the floors of such places should be of solid masonry or concrete, and kept free from cracks into which manure might fall. Furthermore, from May to October inclusive, all temporary deposits of manure or refuse, as well as the contents of all ashpits and dustbins, should be removed at least once a week—the permanent dumping or storing grounds for all such waste or manurial matter being not less than 1,700 yards from human habitations, since marked flies have been found capable of travelling this distance. Even when thus isolated, it would be wise completely to cover manure with sand or earth, if it is to remain stacked for more than ten days, while household refuse should be dealt with by the authorities as rapidly as possible.

The treatment of manure with chemical dressings as soon as it is removed from the stable is often recommended. It may, for example, be sprinkled with chloride of lime, or with liquid paraffin, or sprayed with a solution of iron sulphide. Probably, however, the quantity of chloride of lime necessary to keep away all flies would render the manure quite unfit for agricultural purposes; while the use of paraffin and iron sulphide on a large scale is beset with various practical difficulties. On the whole, therefore, the efforts of authorities should probably be directed mainly against insanitary stables, and the improper accumulation and storage of dung and refuse.

## HOW HOUSEHOLDERS CAN HELP.

Undoubtedly the suppression of the house-fly depends to a very large extent upon the co-operation of the general public. Thus, a brief recital of the means which may be employed for keeping flies out of houses, and for destroying them if they enter, will not be out of place. First and foremost, the householder should make it his business to see that the flies have no chance of breeding upon or in the neighbourhood of his premises. A rule should be made, and strictly enforced, that all moist kitchen refuse should be burnt in the range at least once a day. No waste substance of this description should be placed in the dustbin, which should be reserved exclusively for ashes and dry, inorganic refuse. If this plan were universally adopted, dustbins with close-fitting, fly-proof lids would be superfluous. The same may be said of the speedy removal of all refuse from the neighbourhood of dwelling-houses—a precaution which, in view of wide-spread public indifference to the first principles of hygiene, still calls imperatively for strict observance. In passing, it may be mentioned that a recent writer (Major G. Hurlstone Hardy) strongly advocates the use of *open* dustbins, of which the contents are to be cremated at short intervals; also the setting of traps consisting of kitchen refuse placed in open paper bags which are to be collected and burnt after three days' exposure. In this way, it is claimed, the egg-laying activities of enormous numbers of flies would be rendered futile. Obvious objections to this proposal will doubtless suggest themselves to the reader's mind.

All those who value health will see to it that the windows and ventilators of their store-rooms, larders, etc., are screened by gauze of a fine mesh—wire-gauze being the best and most durable. The doors of all rooms where food or milk is kept should never be left open. As a further precaution, food and drink of all kinds should be protected by covers of muslin or wire-gauze. For destroying flies in living-rooms, many devices are upon the market. Some of these are serviceable, while others are not. In each case the question must be asked: Is the contrivance a real fly-killer, and a fly-killer on an adequate scale? If this point is not capable of practical demonstration, then the invention must be dismissed as worthless. For killing flies in rooms, the burning of pyrethrum powder and the evaporation of carbolic acid on a hot shovel have both been recommended, while it is also claimed that if the sashes, bars, and sills of windows are rubbed with paraffin, all the flies in the room will be destroyed. Perhaps the last-named expedient really prevents flies from entering the room at all. If this is so, then miscible oil would probably be equally effective—and as it is not inflammable it would be safer to use. Quite recently, a non-poisonous anti-fly spray solution has been introduced by Messrs. Heppell & Co., of London. It may be used for spraying curtains, etc., and round window frames and doorways, when it is said to deter flies from entering the room. The preparation has been well spoken of in several authoritative quarters.

Of late years, the use of formalin as a fly-killer has been widely advocated. A sweetened concoction consisting of one ounce of formalin mixed with one pint of milk and water in equal parts is exposed in shallow plates and saucers, a small piece of bread in each serving as an alighting place for the flies. The diluted formalin is not dangerous to man, and may be used without fear even where food is exposed. In fact, it is a useful disinfectant. All other liquids should be removed or covered overnight, so that the formalin mixture may be the only available thirst-quencher when the flies, as their custom is, begin to drink in the early morning. If these precautions are observed, the flies are said to sip the mixture, which kills them so soon that their bodies may be found a short distance from the fatal dish. The present writer is bound to confess that the use of formalin in his own house has not been attended with any very striking results. Either the flies have refrained from drinking, or the mixture is less potent than its advocates aver.

After what has already been said, it is almost superfluous to add that flies should not be allowed access to the unhealthy discharges of the sick, especially in all cases of infectious and contagious diseases.

## PROFESSOR LEFROY'S EXPERIMENTS.

This year (1915) Professor H. Maxwell Lefroy has conducted an exhaustive series of experiments with a view to discovering the most satisfactory methods of coping with the fly peril. At the time of writing, his results have not been made public ; but he has been good enough to give me the following brief outline of the conclusions at which he has arrived. As a bait for fly traps, a concoction of casein, brown sugar, and water in equal parts—the mixture being allowed to stand for twenty-four hours or so before use—proved at once the best and cheapest out of many hundreds that were tested; although Professor Lefroy is careful to add that no bait will attract flies in rooms where ordinary food is exposed. Green oil, or neutral blast furnace oil, in the proportion of one volume mixed with four volumes of earth or sand has given the best results in the treatment of manure on a large scale. One gallon of oil, costing about 1s., when mixed with forty gallons (say thirteen bucketfuls) of earth, will make a dressing sufficient to cover a manure heap of eighty square feet in area. For use in shops, the rotary fly-trap has proved best, while for private houses the use of fly-sprays or the newly invented fly-frame has proved the best and simplest means of keeping flies in check.

## UNCEASING EFFORT NECESSARY.

In conclusion, we may ask : What has been the result of the special efforts to check the increase of flies that have been made in so many quarters this season (1915). Professor Lefroy, to whom the question was put, says : "I believe that the result of the year's work has been a greater interest by the public, a far wider action by municipalities, etc., and a very drastic action in the Army to keep flies down." This opinion is borne out by other authorities; and we may thus congratulate ourselves that a substantial gain has been scored in a matter of enormous importance not merely to the British public, but to the whole civilised world—for the common house-fly is found, and is a pest, practically everywhere. Nevertheless, it will be necessary to guard against slackness in the years to come, for the complete extermination of the house-fly is probably an unattainable ideal. Its effective control however, must be well within the range of practical politics.

# V.—THE MILK STANDARD PROBLEM.

*By D. Edwyn Thomas, Editor of "Farm and Home."*

It cannot be denied that the position in which the question of milk adulteration stands is thoroughly unsatisfactory. Neither of the parties concerned in the controversy—the public officials, on the one hand, and the milk producers and milk vendors on the other—will express themselves as content; all feel that injustice is being done, though naturally they hold opposing views as to the direction in which this injustice operates. The authorities concerned in putting the law in force urge, and probably with truth, that there is a vast amount of adulterated milk sold; that there is considerable difficulty in checking the practice; and that in only a small proportion of cases does a conviction follow the detection of the offence. On the other hand, the producers and vendors assert that milk is an article which is subject to considerable variation in composition; that they have, for practical purposes, no control over the quality; and that it is unfair that an honourable individual should be branded as a cheat because the milk that he sells has fallen—it may be only once over a period of years—below an artificial standard.

The standard, indeed, is the result of the recognition of two facts which may be taken as generally admitted by those who have given the subject attention. Unfortunately, Benches of Magistrates, and even some judges of the High Court, are not always among those who can claim to be well-informed on the milk question and cognizant of such facts.

These facts are :—

(1). That the standard set up by the Board of Agriculture of 3 per cent. fat and 8·50 per cent. solids, not fat, is one which is fair and reasonable as applicable to the milk generally yielded by the dairy cattle of this country, and that as a rule most cows give milk as rich as, if not appreciably richer than, this, *on the average of a number of milkings.*

(2) That individual cows, and even a whole herd, sometimes give milk that falls below the standard, either in the percentage of fat or in that of other solids, or, though rarely, even in both.

It is hardly necessary to demonstrate the truth of the first statement. The enormous number of analyses available in proof thereof puts the matter beyond question. With varying force the same thing may be said as to the second, for analyses show, not only that the quality of milk from the same cow may fluctuate violently, but that there is much genuine milk which falls below the standard. Because they realised this, the Board of Agriculture in 1901 ordained that such a falling off was to be considered only presumptive evidence of adulteration, and that such presumption might be rebutted by direct evidence showing that the sample had not been interfered with. This provision, if not entirely satisfactory to the producers, constituted at least a very useful protection; but Benches of Magistrates have often ignored it, and have convicted defendants who, on the admission of the magistrates themselves, had demonstrated that no adulteration had been committed. Whatever, in the case of an appeal, may be the final decision of the highest court, it cannot be denied that such a conviction is distinctly contrary to the intention of the Board of Agriculture when it created the standard. Although it is not the purpose of this article to deal with legal technicalities, it is not out of place to point out that it is certainly a curious thing that law administrators should adopt the standard set up in these Regulations, and set up there only, and waive aside as immaterial the other provisions of the Regulations. It is this action on the part of magistrates that has caused the renewed expression of dissatisfaction on the part of those who are connected with dairy farming and milk selling, and has prompted associations to combine to test its legality when opportunity offers.

## A STRIKING EXAMPLE.

While it is hardly necessary to demonstrate in these pages that cases of the production of genuine milk below standard frequently occur, I may be permitted to quote figures that attracted attention some years ago, because they are based on records taken at a show of the Bath and West and Southern Counties Society.*

In the Milk-Test Class for larger animals, there were 11 cows entered:—one Guernsey, two Jerseys, two Lincoln Red Shorthorns, and six Shorthorns. Of the eight Shorthorns and Lincolns, six gave morning's milk showing less than 3 per cent. of fat; the milk of the seventh only just reached the standard. It is noteworthy that even if the milk of two of the Channel Islanders—including that of a Jersey, which gave 5·4 per cent. fat—were mixed with that of

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' Croydon, 1901.

these eight animals, the analysis of the whole would still have shown only 2·86 per cent. of fat. But the individual analyses are striking. The late Lord Rothschild's Shorthorn gave only 2·40 per cent. of fat, while Mr. Evens's Lincoln Red, which eventually gained the first prize in the class, produced an even poorer sample with 2·25 per cent. It is almost a pity that this milk was not offered for sale and made the subject of the attentions of a zealous inspector. Had Lord Rothschild or Mr. Evens been called upon, as many other milk producers have been, to answer a charge of cheating the public by selling " adulterated " milk it is probable that the problem now before the dairy associations, which owes its origin largely to the case of Smithies *v.* Bridge, heard in the law courts about that period, would not still be awaiting solution.

It would be foolish to draw exaggerated inferences from this case. There were doubtless some special circumstances that affected all the animals unfavourably, but it is precisely the fact that unfavourable influences, which cannot be foreseen or controlled, may operate in this manner, that gives force to the plea so often put forward in vain by unfortunate defendants at petty sessions.

I give below some recent figures of tests for fat in milk supplied to a high class dairy. Each set of figures relates to the supply of the same farmer, and in each case it is the analysis of the mixed milk of the herd and not of the yield of a single cow.

A.—2.9, 3.9, 3.50, 3.8, 3.8, 3.5, 3.6.
B.—3.5, 2.9, 3.1, 2.8, 3.5, 3.6.
C.—3.0, 2.9, 3.7 (for several weeks in succession).
D.- 5.6, 4.0, 3.3, 3.0, 3.0, 3.75.

The figures are representative of a large number, and are quoted in proof of the statement made that many farmers who, as a rule, supply milk far above the standard, occasionally obtain from a whole herd milk which, under the conditions in which milk samples are taken, may be certified by an analyst to be adulterated. It is obvious that if the average milk of a herd falls as low as 2·9 per cent., there must be individual members whose milk is of very poor quality, and the smaller the herd, the greater is the risk which the vendor runs when accidental causes bring about an impairment of the quality.

## RECENT EVIDENCE.

[Since this paper was written, the report has been issued of the Farmers' Milk Competition, organised in connection with the Royal Agricultural Society's meeting at Nottingham, and this contains such unimpeachable evidence regarding variations in the quality of the mixed milk of herds that reference to it cannot well be omitted. The milk from 98 separate herds belonging to farmers supplying the district were sampled. It may be taken for granted that the milk was in all cases unadulterated, inasmuch as men entering into a competition for prizes would not be likely to handicap themselves, and it is not unreasonable to assume that the herds were among the best in the neighbourhood, or were believed by their owners to be among the best, since the owner. conscious of possessing a poor herd, would not challenge comparison by entering into such a competition. The results show that while on the average the milk was of a high standard—in 72 herds classed together it showed 3.63 fat and 9.09 non-fatty solids—no fewer than 37 out of these 72 competitors were disqualified because one of their samples of milk, either morning's or evening's, fell below the requirements of the standard. To put the matter bluntly, if the present reliance on the evidence afforded by the analysis of a single sample is justified, then one out of every two of these leading milk producers of Nottingham must be considered guilty of the discreditable offence of milk adulteration, and they are so foolish that they deliberately carry out the process to their own loss.

It is very difficult to hold the balance evenly in this matter, and numerous suggestions have been put forward from the points of view of the different parties concerned. The contention, gravely submitted by the able secretary of a milk producers' association, that conviction should follow only on proof of actual adulteration, is ingenuous; it would be very satisfactory from the standpoint of the adulterator, but, as it would remove every vestige of protection from the public, the proposal may be put aside as one to which it is inconceivable that Parliament would agree. The farmer has been rather inclined to view with favour the suggestion that he should be allowed an "appeal to the cow"—that a sample should be taken of the milk produced by the cow or cows, and his guilt or innocence determined by a comparison between this milk and the sample declared by the analyst to be adulterated. But experience has shown that this is, indeed, a very weak reed for the innocent producer to lean upon. In the majority of cases the second milk is up to, or over, the standard ; any lapse is probably due to a temporary cause, and this cause may have ceased to operate long before the analyst's report has been received and the "appeal" can be proceeded with. If the animal has returned to normal condition the result of the appeal can only be to provide apparent proof of the owner's guilt ; in any case the appeal is purely chance work and cannot provide a satisfactory solution of the problem.

## A PRACTICABLE PLAN.

Regarding the matter from the attitude of the man who is content with the profit to be obtained from the sale of genuine milk, there are these points to note :—

(1) He protests against being made the victim of isolated vagaries over which he can exercise no effective control.

(2) He suffers from the unfair competition of those who really adulterate their milk.

On the other hand, while the importance of good quality is not to be undervalued, the consumer cannot be said to suffer seriously from a slight falling off that may occur say once or twice in a season, and is mainly interested in obtaining protection from the habitual offender who more or less regularly supplies milk that is watered or deprived of a portion of its fat. A remedy which gives both parties all the protection they are fairly entitled to may be found in the adoption of a system by which the selling of milk below standard shall be made an offence entailing slight penalties, *inflicted automatically without publicity*, according to the deficiency of fat or non-fatty solids. For example, a sample is taken in the present way of G's milk, and in due course he is informed by the authorities that, as the analyst's report shows that it contains only 2·8 per cent. of fat, he becomes liable to a fine of ——; in the case of H, which has but 2·7 per cent., the fine will be somewhat larger, but, as the object in view is not merely or mainly punitive, the amounts should be graduated on a low scale. If he does not dispute the analysis, well and good ; he pays the amount. If he disputes it, he has one of the samples and can get his own analysis, and the case can be fought out in the present fashion. Probably he will pay and there the matter ends for the time being. (A similar plan is, I believe, followed in some towns in dealing with householders who permit their chimneys to catch fire, and visitors to certain Continental towns have occasionally found themselves called to account in the same way for contraventions of rules as to trespassing and the like.) But a record of the samples is kept, and by its aid the authorities will be able to find out who are the vendors or producers most frequently called to account in this way ; the sheep can be separated from the goats, and when it becomes evident that a man habitually sells poor milk, special attention can be paid to him in the hope of detecting him in actual adulteration or of finding convincing proof of the commission of the offence, and if this is forthcoming he should be severely dealt with, even sent for a term of imprisonment.

A vendor who regularly or frequently sells milk below standard may without injustice be assumed to be guilty of tampering, and in any case of prosecution the register of previous defaults should be admitted as evidence for what it is worth.

The foregoing plan would seem to be much fairer both to the producer and to the consumer.

One result of the change would be the freeing of the inspectors from attendance at court, which now takes up much of their time; they would thus be able to exercise better supervision by taking a much larger number of samples.

Some of the Health Authorities write as if they really held the opinion that milk containing anything less than 3 per cent. of fat has no food value whatever; such a contention cannot stand a moment's examination. In any case from the standpoint of both the public and the authorities there should be no objection to this plan, *if we may assume that their main object is to keep up the quality of the supply of milk.*

Looking at it from the seller's position, there is the one obvious criticism that the less he sees of the inspectors the better he is pleased, and he is not likely to regard with enthusiasm any plan that brings him more frequently in contact with these public officials. The adulterating vendor will naturally not care for the scheme, but we need not consider his wishes, and what I suggest to the honest dealer is that the plan affords him decided advantages, and that he cannot expect to purchase these advantages except at a price. He will, under its provisions, have a sense of security that he does not possess at present; he will run no risk of being condemned as a rogue and of having his business ruined as the result of the analysis of a single sample which falls below standard, either owing to accident of weather or, it may be, the dishonesty of an employé; he will be judged by the milk that he sells the year round or over an extended period. Let it be borne in mind, by those who would urge that there may be great opposition to the proposal, that the statistics of even those who speak most strongly of milk adulteration demonstrate that the majority of milk sellers are upright and respectable individuals.

The object of the authorities should be to encourage the production and distribution of milk of high quality, the prevention of adulteration rather than the punishment of offences, and while it would hardly be fair to pillory the—it may be—inadvertent offender, they might very well consider the propriety of publishing the good analyses. At any rate, the vendor should be informed of the result of all his analyses, whether favourable or unfavourable, and he may be trusted to make the most of an official testimony that assists him in the building up of a good reputation. Surely, if the proportion of fat in milk is a matter of such great importance that milk of a low quality is even adjudged not to be " milk " at all, it is to the public interest that vendors who supply the article of the best quality should be known.

## VI.—THE WARFARE AGAINST WEEDS.

*By S. Leonard Bastin.*

### INTRODUCTORY.

There is little doubt that many farmers are apt to regard weeds with a considerable amount of indifference. The idea seems to be that these pests are a kind of necessary evil against which certain remedies may be adopted with a limited amount of success. Few people appear to realise that, were only a more determined effort made in all directions, it would be possible, even if one could not stamp them out altogether, to reduce the number of weeds to a negligible quantity. This may seem to be rather an extravagant statement to make, but in China the weed problem has been dealt with very effectively. This is principally owing to the fact that the population of the great Eastern Empire is so large that it could never exist at all unless every yard of land that will grow anything was brought under cultivation; there is simply no room for weeds. In a large part of China the chances that a botanist would discover any wild plants are very small indeed. It has been said that the hunter " may find stray plants of millet among the beans, or lentils among the corn, and so on; but of weeds pure and simple, uncultivated plants, he finds scarcely a specimen, and anything answering to the gay poppies and rampant bindweeds of our cornfields is unknown." Labour in China is cheap and abundant, so that the farmers do not experience much difficulty in carrying on a very effective warfare against weeds without involving themselves in a great outlay. But much might be done in this country to grapple with the weed problem were a determined effort made. With these few introductory remarks we will pass to the general consideration of the question of weeds and their suppression.

### THE HARM THAT WEEDS DO.

Every weed on the land should be regarded in the light of a robber. It is occupying a position on which some useful plant would grow and it is taking away moisture and nutriment from the soil which should be at the disposal of the crop. Weeds often do a lot of harm when they are mixed up with a crop owing to the fact that they screen away the light. Some recent experiments have been carried out in the United States of America to demonstrate the value of abundant light as a preventive of disease in all crops. A strong light is fatal to the development of many mildews, and a good illumination tends to increase the disease-resisting powers of all plants. For instance, numerous tests made with Lettuce plants showed that the common disease known as Stem Rot (*Sclerotinia*) was always prevented if the plants were set sufficiently far apart to allow the light to reach the stems. Not a few weeds favour the development of serious insect pests. Take the case of the Charlock (*Brassica sinapis*) as an illustration. This plant is almost always in the early summer attacked by the " Turnip Fly " ; this is at a time when the cultivated plants upon which it lives are mostly absent from the fields. In a similar way the Turnip-gall Weevil is frequently found on the roots of the Charlock. Again, the minute fungus which brings about the condition known as " Finger-and-Toe " in Turnips finds a home on the roots of the Charlock. Certain weeds are parasitic and types of these are to be seen in the Dodder (*Cuscuta*) (Fig. 1) several species of which are more or less common ; the Broomrapes (*Orobanche*) and the Yellow Rattle (*Rhinanthus Crista-galli*). The Dodders and the Broomrapes are very advanced parasites ; the plants possess no chloroplasts, and they are quite unable to take up carbon dioxide from the air. Hence they depend entirely for their food material on the manufactured products which they find in the host plant. Both the Dodder and the Broomrapes make their chief attacks upon Clovers and Lucerne, although where these plants are not to be found they may commence operations on other species. Observation has shown that so rapidly does the Dodder, for instance, spread, that a single plant may kill all the Clover or Lucerne plants on an area of about thirty square yards in three months. The attacked plants go black, and to all appearance the ground might have been burnt with fire. The Yellow Rattle, although only a semi-parasite, is often the cause of a great deal of damage. It is sometimes very abundant in pastures, where it thrives by reason of the fact that it attaches its haustoria (suckers) to the roots of the grass plants. The plant has green leaves and is able to take up carbon dioxide from the air, though it does not appear to be in a position to lead an independent existence for any length of time. The Yellow Rattle does a great deal of harm, owing to the fact that it kills or seriously weakens the grass plants. Cattle do not like the plant, and its presence in hay will lessen the value of the material. It is also said to impart a bad taste to butter which has been made from the milk of cows feeding over fields where the Yellow Rattle is growing. Other weeds may be seriously poisonous, such as the Meadow Saffron (*Colchicum autumnale*) and the Water Hemlock (*Cicuta virosa*). The former plant, although quite unknown in some districts, is very common in others. The poisonous principle Colchicine seems to have a cumulative effect on cattle, seeing that a small quantity of the plant eaten each day for a period leads to fatal results. Lastly, when weeds seed they may cause loss to the farmer. The presence of weed seeds lowers the value of the seeds of useful plants, and they cannot be got rid of without a good deal of trouble. In numerous ways then the presence of weeds on cultivated land tends to cause loss to the agriculturist. The cleaner a farm is the more bountiful will be the produce. It should never be forgotten that where weeds are permitted to grow unchecked the best result is not being secured from a farm. Experiments have shown that, on land where the weeds are kept well under, the yield may easily be 50 per cent. higher than on a piece of ground which is not weeded at all.

## HOW WEEDS ARE DISTRIBUTED.

Many farmers, who take a real interest in the weed problem, do not make a sufficiently close study of the habits of the obnoxious plants. The weeds are there, whence they came, or how they travelled, is not a matter which interests your indifferent agriculturist at all. One may first briefly touch upon the natural means by which weeds get about. These are very efficient, so much so that many a weed when introduced into a new country has spread all over a vast area in a marvellously short time. The well-known case of the Thistle is an instance in point. Whether the plant was introduced into Australia by an emigrant Scotchman, as commonly reported, it is impossible to say. The fact remains that the Thistle found its way into the island-continent somehow, and in a few years became a far more serious trouble to the farmers than any native weeds. In passing, it is interesting to note the way in which European weeds are threatening to dominate the world. In South America, for instance, all the common cornweeds grow with such vigour that they seem likely to oust the native vegetation. Very much the same kind of thing is taking place in New Zealand, where special laws have been passed to deal with the suppression of such weeds as Dock and Sow Thistle. There is little doubt that a good deal of this success in the matter of colonisation is due to the astonishingly efficient means by which weeds are distributed. The Thistles, in their manner of seed dispersal, are typical of a large number of our worst weeds. The seeds are provided with an appendage of fluffy hairs, and, as a result, they are rendered extremely buoyant. When there is a light breeze, these seeds will travel for a considerable distance, and may make their way across many fields before finding a resting place. A curious fact has been observed in the case of some species of Thistle, which is of special interest at the present time. Should the flying contrivance become entangled in the branch of a tree, or knock sharply against a wall, the fruit, which is very lightly attached, at once falls to earth. (Fig. 3.) The plan is very much on the lines of the bomb-dropping from aircraft, concerning which we hear so much nowadays. This dropping of seeds goes far to account for the fact which has often puzzled observers that so large a number of weeds are to be found by the sides of hedges and walls. In some instances, the seeds are adorned with a wing-like device which serves the same purpose as the fluffy hairs in keeping the seeds buoyant. Good illustrations are to be seen in the fruits of the Dock (*Rumex*). The seeds of some weeds are extremely light and small so that they may be carried by the breezes to a considerable distance from the plant. Examples of this class of seed are to be found in the case of the Poppy and the Broomrape. Other weeds secure a wide distribution of their seeds owing to the fact that these are enclosed in a covering adorned with hooks, or some adhesive substance, which cause the object to cling to the coat of a passing animal. The Burdock (*Arctium lappa*) is a good illustration of this particular method, for the hooks are large enough to be discerned with the unaided eye. (Fig. 2,) The hooks on the seed vessels of the wild Carrot (*Daucus carota*) are comparatively small, but they are very effective in causing the fruits to attach themselves to almost anything with which they come in contact. (Fig. 5.) Some common weeds, such as the Creeping Thistle (*Cnicus arvensis*) and the Couch Grasses (*Agropyrum repens*), (*Agrostis vulgaris*) and (*Arrhenatherum avenaceum*) are spread about to a considerable extent by their root-stocks. It is not only that they travel around in the immediate vicinity of the parent plant by means of their creeping underground stems ; often enough portions of these become detached, and these may be carried from one field to another, or even to greater distances by various means. They might be blown about by the wind or picked up on the hoof of some animal. Wherever they finally settle, if they have a joint, they will take root and be able to develop into a plant.

The more artificial means by which the seeds of weeds may be carried about may be briefly summarised. (1.) The use of impure seeds was at one time a very common source, though nowadays, when merchants take great pains in the matter, the difficulty is nothing like what it used to be, but with the utmost care it is not always possible to eliminate the seeds of weeds. This is especially the case when they are similar in size to the seeds of the beneficent plant amongst which they are mingled. Thus the seeds of the large American Dodder (*Cuscuta Gronovii*) are almost exactly the same size as that of Lucerne seed, and it is therefore most difficult to separate the two by sifting. Happily, the seeds of most of our common weeds are more easily taken away from good seed. The importance of great care in this direction will be realised when it is stated that 1 per cent. of dock seed in a mixture of grass and clover means 10 or more dock plants per square yard all over the field wherever such a sample is sown at the ordinary rate for leys. (2.) Of course, hay may contain a quantity of these undesirable seeds. In numerous cases it has been demonstrated that the seeds do not suffer, and may even germinate better after passing through the stomach of an animal. (3.) The seeds of weeds are often distributed through the agency of farmyard manure. A wise plan is to see that all manure is well rotted before it is spread upon the fields. In these circumstances, the number of seeds which will germinate will probably not be very large. It should not be forgotten, however, that the seeds of some plants have the power to lie in a dormant state for a long while. Charlock seed, for instance, contains a quantity of oil, and this is probably responsible for the astonishing vitality which it often exhibits. Charlock does not, as a rule, occur to any extent upon grass land; yet ground which has been under grass for many years will, when broken up, show an abundant growth of this weed. The same thing often happens after the extra deep cultivation of land. In these cases, there is little doubt that the weeds have been lying dormant, possibly for years, at a considerable depth in the soil, and start to germinate on being brought near to the surface.

## HOW WEEDS INCREASE.

Few people realise the prodigious scale on which weeds increase. We have seen that in many cases the seeds are very largely distributed by various clever devices. Let us consider for a moment the extent to which these seeds are produced. Some interesting estimates have been made as to the number of seeds produced by a few typical plants. Thus it is calculated that a single plant of the following species would in a season produce the undermentioned numbers of seeds :—

CHARLOCK—anything up to 4,000 seeds.
POPPY—from 10,000 to 50,000 in the case of a large plant.
SHEPHERD'S PURSE—64,000.
FLIXWEED—730,000.

In connection with the latter plant, Kerner has made a most interesting calculation. He considered that in three years the offspring from a single specimen of the Flixweed would, if unchecked in any way, cover the dry land of the world 2,000 times over. It must be borne in mind that many annual weeds, such as the Groundsel (*Senecio vulgaris*) and the Chickweed (*Stellaria media*) manage to get in several generations of plants during the year. So that one of these plants allowed to flourish without hindrance would be responsible for a colossal army of weeds at the end of the season. From this, it will be realised that any attempt to deal with the weed problem must be carried out with great vigour, if the effort is to be at all successful.

## THE SUPPRESSION OF WEEDS.

When one thinks of the possibilities of increase in every plant, it is evident that weeds, wherever they are growing, should be attacked without respite. A large Thistle in a corner of a field will produce enough seeds to cause trouble over acres of land. A strip of land by the roadside will grow vast crops of weeds which, in their offspring, will be sufficient to stock whole farms. In many of the Dominions, it is a punishable offence for the farmer to neglect to destroy the weeds by the roads which adjoin his property. For their own good, farmers should attack weeds wherever they find them, even though they may be growing on waste patches of land which it is no one's business to look after. Obviously, in the case of an annual, the trouble will be at an end if the plant can be prevented seeding. It is well to allow the plants to develop their flowers before cutting off the leading shoots. If the shoots are cut off at too early a stage, other growths will develop, and the whole operation will have to be repeated. It is always a good plan to prevent a weed seeding, but in the case of a biennial or a perennial further measures must be taken. Many of the plants when cut down near to the ground will, for a while at any rate, continue to grow with great vigour. It should be borne in mind that this new growth will be made at the expense of the stored-up energy in the

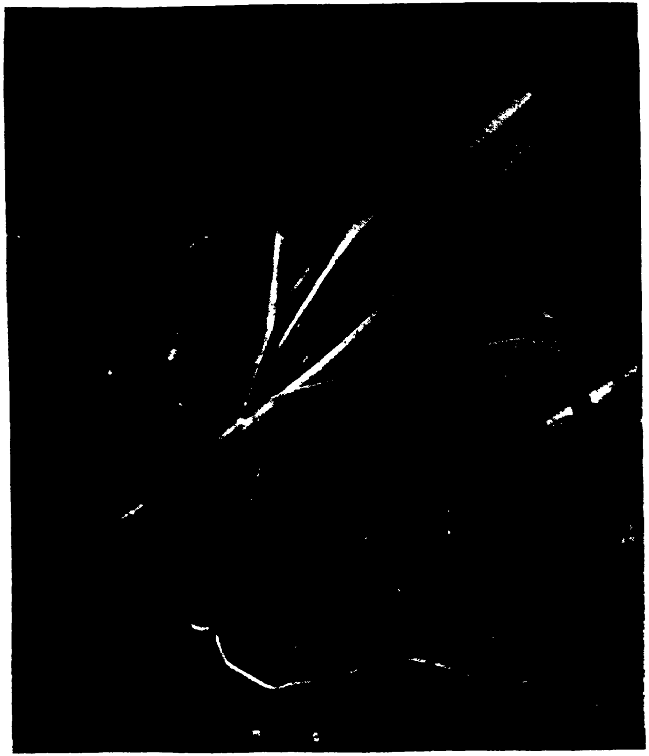

Fig. 1. How the Dodder attacks its victims.

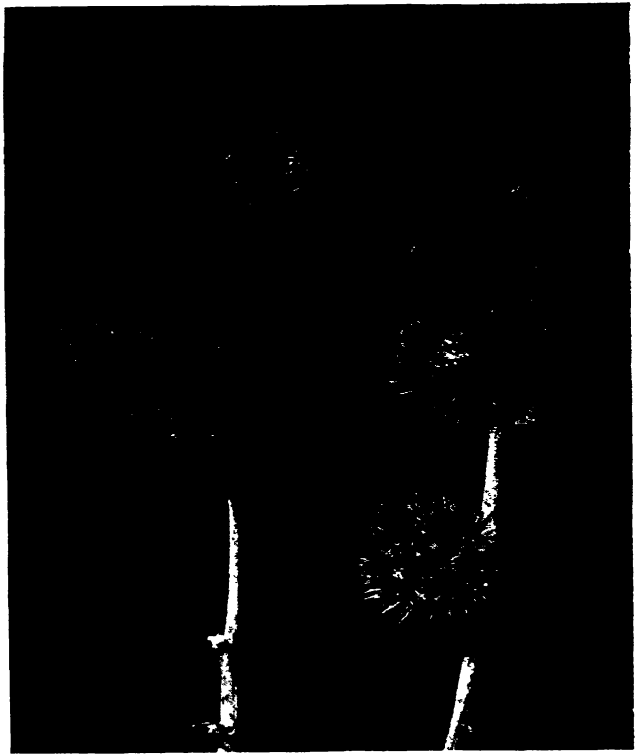

Fig. 2.—Fruit heads of Burdock.

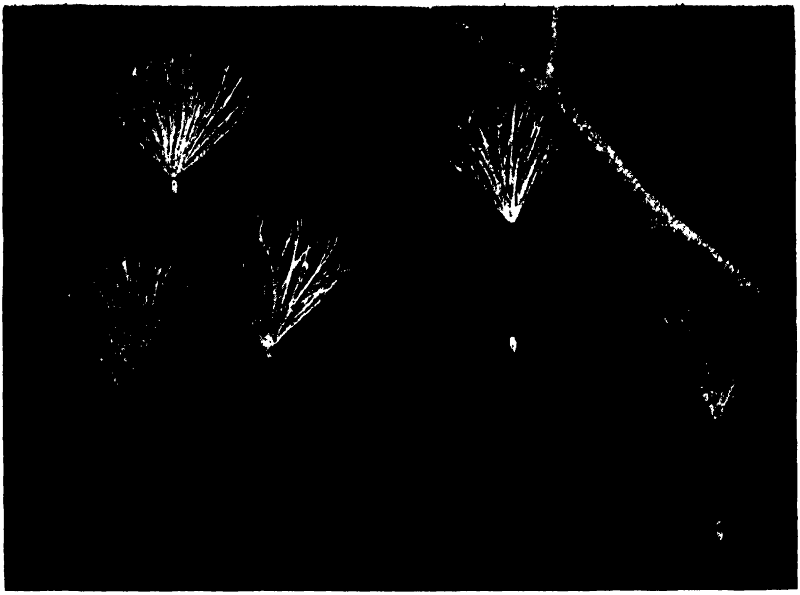

Fig. 3. Dropping of Thistle fruits, when the parachutes knock against an obstacle.

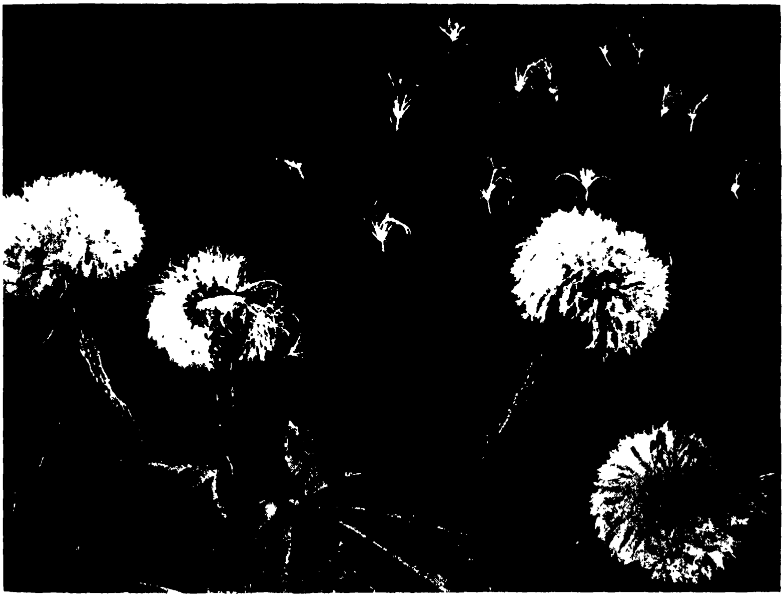

Fig. 4.—Fruits of the Coltsfoot.

Fig. 5.—Fruits of Wild Carrot.

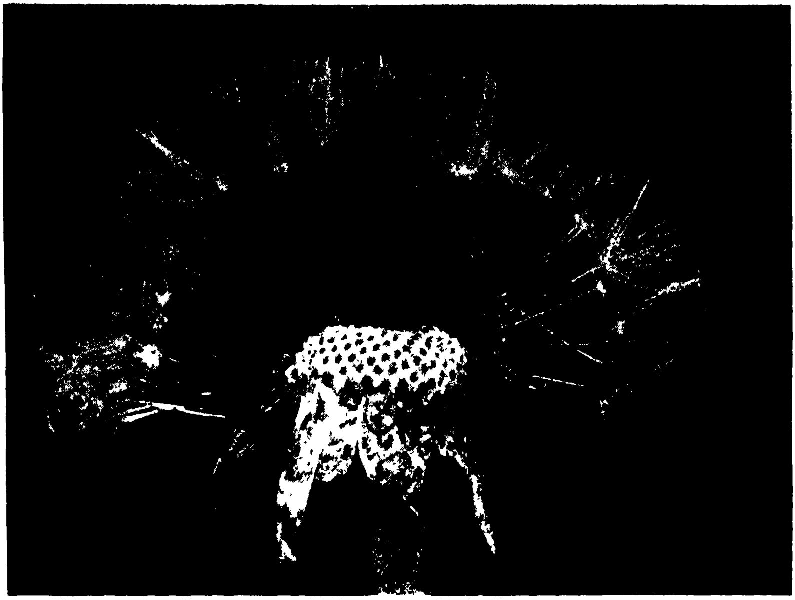

Fig. 6. Fruiting head of Dandelion.

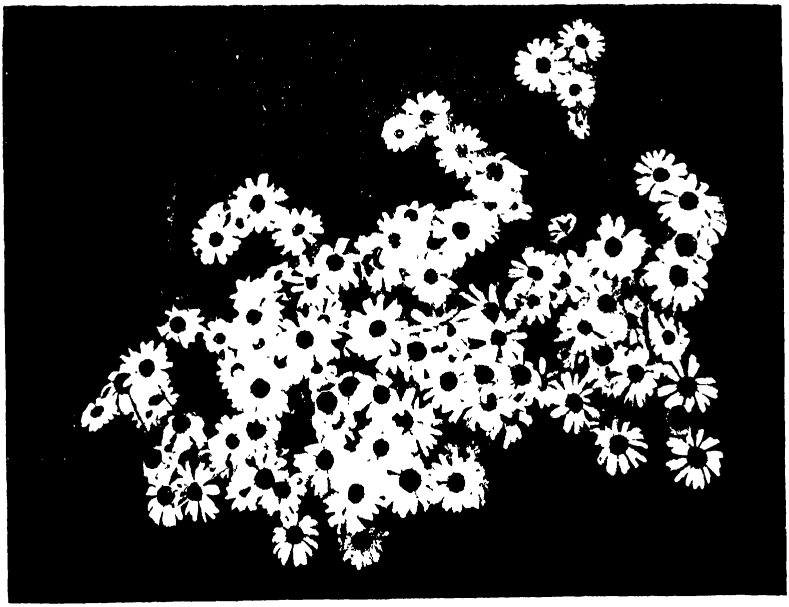

Fig. 7. Plant of Mayweed in full bloom.

Fig. 8. The Dwarf Plume Thistle and other weeds that "star out reduce past

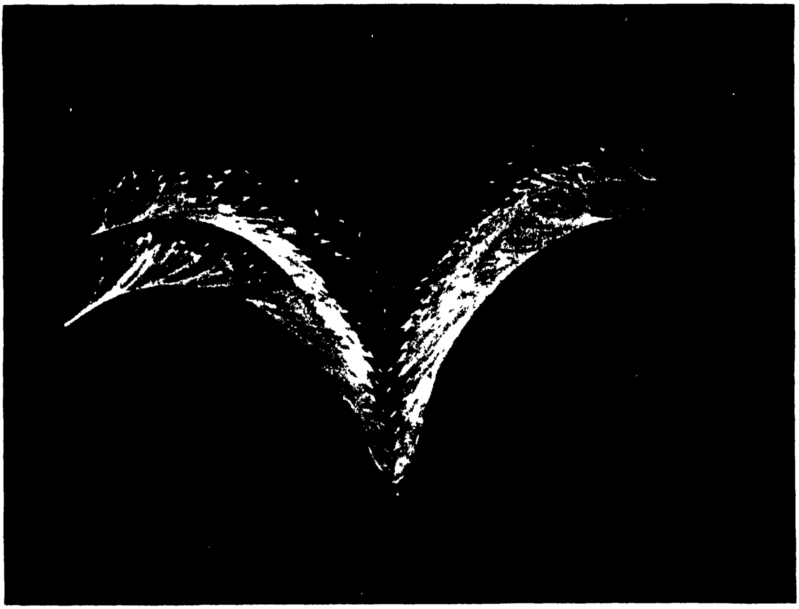

Fig. 9. Flying Fruits of Willow Herb.

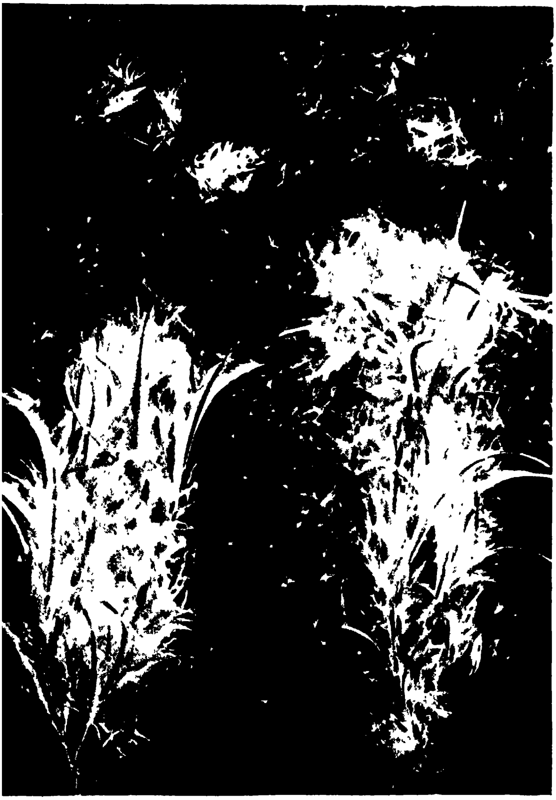

Fig. 10. —The Willow Herb dispensing its seeds.

root-stock. The development of the new shoots puts a great strain on the plant, and, if these are cut down after they have developed, the specimen will be so seriously weakened that in most cases it will die. Of course, in the case of those plants, such as the Creeping Thistle, Field Bindweed, and the Couch Grasses, the attack must also be directed towards the destruction of the underground runners. These are often extremely difficult to deal with, and almost the only plan worth following is that of a thorough cultivation in which the runners are brought to the surface, collected, and finally burnt. The most effective means of all of dealing with perennial weeds is that of hand-pulling, or digging up with a fork or a spade. There is nothing to beat this method, but it is a very expensive plan, and often quite out of the question owing to the scarcity of labour. Children cannot be trusted to carry out the work sufficiently well, and half measures are valueless.

It has been shown that a good deal may be done in the fight against weeds by the application of manure and artificial fertilisers. All kinds of nitrogenous manures stimulate the growth of grasses; under such favourable conditions these develop so vigorously that Buttercups, Hawkweeds, and many other weeds will be choked. Certain weeds, of which the Corn Marigold is a good example, strongly dislike lime. A dressing of lime remedies a sour condition of soil, and at the same time helps to check the growth of certain weeds. The plan of growing "smother" crops on land which has been weed infested, is sometimes very effective. Suitable crops include Vetches, Mustard, Rape, Rye and Maize. The dense shade and heavy growth of these plants discourages the development of weeds. With certain weeds, spraying with chemical solutions is often very valuable. Sulphate of copper and sulphate of iron are chiefly employed. Thus, in the case of Charlock, in a corn field a 4 per cent. copper solution, used at the rate of 40 gallons per acre, is most effective. The wheat is not injured at all, probably owing to the fact that the smooth erect leaves do not retain the liquid. On the other hand, the rough horizontal leaves of the Charlock catch the solution, and the plants are killed. The same treatment may be safely adopted in the case of almost all cereals, clovers, and grasses, though with certain crops, such as peas and beans, it is needful to use a much weaker solution. Weeds with smooth or small leaves, such as the Dock and Smooth-leaved Charlock, are not easily destroyed by spraying, although they may be seriously crippled. Obviously the method has its limitations, for the solution must not be used in such strength that it injures the legitimate crop.

## THE MOST TROUBLESOME WEEDS.

In conclusion, one may usefully give a list of the common and most pernicious weeds. In each case, a brief description is appended which should help in identification. None of these plants should ever be tolerated in the vicinity of cultivated land. The plants are arranged in alphabetical order under their common English names. More or less local plants, which may be common in certain districts but are not widespread, are not included.

BROOMRAPE. (*Orobanche*). These plants are parasitic on the roots of Clover and allied species. They send flowering spikes from six to eight inches in height. These are of a uniformly dull brown colour. The Broomrapes flower in June and July. The seeds are very small, and sometimes lie dormant in the ground for years. Several species of Broomrape are common, but all are similar in appearance.

BURDOCK. (*Arctium lappa*). A strong growing herbaceous plant, three or four feet in height with large leaves. The purple florets, which are produced in the summer, are gathered together in heads; these are enclosed in an involucre of hooked scales. The scales become attached to the coats of passing animals, and in this manner the seeds are distributed. As a rule the Burdock favours the more shady parts of pasture land.

BUTTERCUP. (*Ranunculus sp.*) Most of the species are acrid and severa of them are harmful if eaten largely by cattle; as a rule, animals seem to avoid the plants. The two Buttercups which are the most harmful from the farmers' point of view are the Creeping Buttercup (*R. repens*) and the Corn Cornfoot (*R. arvensis*). The former of these spreads rapidly by means of its runners; the stems take root wherever a leaf is produced. The flowers are yellow and the plant is a perennial. The Corn Crowfoot, said to be the most poisonous of all the Buttercups, is often very abundant in cornfields, especially in the south of England.

CHARLOCK (and allied species). (*Brassica sp.*). The common Charlock is an annual plant, growing between one and two feet in height and producing rough toothed leaves. The flowers, which are bright yellow, are produced all the summer, and the production of seeds is enormous. The Wild Navew or Smooth-leaved Charlock (*B. campestris*) is similar in appearance to the common Charlock, but it is readily distinguished by its smooth upper leaves. The White Mustard (*B. alba*) has somewhat large yellow flowers, and its leaves are lobed. Several other species of Brassicae are common.

CHICKWEED. (*Stellaria media*). One of the commonest plants. The Chickweed has egg-shaped leaves and small white flowers; these are produced all the year round so that although the plant is an annual it is always in evidence.

COLT'S FOOT. (*Tussilago Farfara*). This plant is a most pernicious weed, often abounding where the soil is ill-drained. The large golden yellow flowers are produced before the roundish heart-shaped leaves appear. As a strong growing perennial the Colt's Foot is a difficult plant to exterminate. . Fig. 4.)

CORNCOCKLE. (*Agrostemma Githago*). A handsome plant with purple flowers, common in corn fields. The Corncockle is an annual, and its seeds are usually ripe about the time of harvest. These are large and difficult to separate from corn. The plant is easily recognised by its downy stem.

**CORN MARIGOLD.** (*Chrysanthemum segetum*). This is really a very attractive plant, with its large daisy-shaped flowers of a golden yellow colour. The leaves and stems are smooth and glaucous. Though the Corn Marigold is an annual it has two flowering times. These are in June and July and again in October and November. The weed is a most pernicious one and it should never be tolerated.

**COUCH GRASS.** This term is applied to at least three common species of grass. The true Couch Grass (*Agropyrum repens*): the Black Twitch Grass (*Agrostis vulgaris*), and the Onion Couch Grass (*Arrhenatherum avenaceum*). The first-named is one of the worst of weeds. The underground stems of the plant are about as thick as a coarse knitting needle, and these push about in all directions. As well, too, the Couch Grass is propagated by seeds which succeed the ears borne on stems varying from one to four feet in length. The leaves are somewhat hairy on the upper surface. The Couch Grass is a perennial. The Black Twitch Grass has a creeping habit, but the stems lie on the surface, or at any rate are only just covered by the soil. The leaves are somewhat smoother than those of the True Couch Grass though they may vary considerably. This perennial is propagated by seeds as well as by the creeping stems. The Onion Couch Grass is sometimes known as the Bulbous Oat Grass on account of its curious swollen root stock. These little "bulbs" are often produced in strings, and as each one possesses a bud the plant is often spread over a large area by the use of farm implements. The spikelets and seeds are about the size of a small oat.

**DAISY.** (*Bellis perennis*). This plant is so well-known that a description is unnecessary. As a strong growing perennial, which flowers all the year round, the Daisy is not easy to exterminate.

**DANDELION.** (*Leontodon taraxacum*). Another plant which hardly needs a description. The Dandelion grows actively, and flowers all through the year. The familiar "clocks" are, of course, formed of the flying fruits. The Dandelion is a very strong-growing perennial. (Fig. 6.)

**DOCK AND SORREL.** (*Rumex sp.*). There are a number of plants known as Dock and Sorrel. The best known is, perhaps, the Broad-leaved Dock (*R. obtusifolius*). This plant may be two or three feet in height, and it has large oblong leaves. The small flowers are produced in August, and, when collected together in a panicle, have a reddish appearance. The Curled Dock (*Rumex crispus*) is another common species, and in this case the leaves are waved and crisped along the margins. The small flowers are reddish or green. These in common with other species of Dock are perennial, and several of them are able to produce buds on their roots. The Common Sorrel (*Rumex acetosa*) is a well-known plant on account of the pleasant acidity of its leaves. It is often very abundant in meadows, where the whorled spikes of reddish green flowers stand up above the grass. Sheep's Sorrel (*Rumex acetosella*) is a very much smaller plant than the last. Towards the end of the summer the foliage becomes tinted with a reddish colour. Both these species are perennial.

**DODDER.** (*Cuscuta sp.*). Several species of this well-known parasite occur in Britain. All are somewhat similar in appearance, in that they are quite leafless, and the plant consists of quantities which twine about the hosts from which the Dodder derives its sustenance. The flowers are small, and are produced in clusters. The Dodders are annual, but they are most dangerous weeds on account of the rapidity with which they develop.

FIELD BINDWEED. (*Convolvulus arvensis*). A beautiful plant of a trailing or climbing habit, producing large rose-coloured blooms. The Field Bindweed is a perennial, and in spite of its attractions it must be classed as a baneful weed.

FUMITORY. (*Fumaria officinalis*). This plant has pretty delicate foliage and rose-coloured flowers tipped with purple. It is an annual, but specimens may be found in flower nearly all the year round. Several varieties (or species as some botanists say) are to be met with.

GROUNDSEL. (*Senecio vulgaris*). An extremely common plant, with small yellow flowers crowded together in clusters. The leaves are deeply toothed. The seeds have hairy appendages and are dispersed by wind. The Groundsel is an annual, but plants are in flower all through the year.

GOAT'S BEARD. (*Tragopogon pratensis*). This is a handsome erect plant, usually about a couple of feet in height. The glaucous leaves are very broad at the base, and taper to the tip. The flowers are large and bright yellow. The fruits are adorned with hairs, and are distributed by wind agency. The Goat's Beard flowers in June and July, and is a biennial.

GOOSEFOOT. (*Chenopodium album*). This is one of the most troublesome of the annual weeds. The plant is related to the Mangold, and often acts as a host to the Mangold Fly. The Goosefoot grows to the height of two or three feet, and its leaves are narrow and toothed. The flowers, which appear in the summer, are arranged in spikes ; they are small and greenish in colour. The plant is easily recognised by the fact that the whole plant appears to be powdered with whitish particles.

HAWK WEEDS. (*Hieracium sp.*). There are a very large number of more or less distinct species of Hawk weed. The flowers are yellow or orange. One of the commonest in pastures is the Mouse Ear Hawk Weed (*H. Pilosella*). This species has lemon coloured flowers, undivided leaves, which are hoary underneath. The Hawkweeds have an unpleasant bitter taste, and should be discouraged owing to the habit they have of "starring" out their leaves in such a way that the surrounding grasses are killed. All the species are perennial.

HEDGE MUSTARD. (*Sisymbrium officinale*). An extremely common annual with hairy, deeply lobed leaves and small yellow flowers. The plant is generally a foot or so in height. The Flixweed (*S. sophia*) is not quite so common ; it is a somewhat similar plant to the Hedge Mustard though more slender in all respects. Both the plants produce seed on a prodigious scale.

MAYWEED. (*Matricaria inodora*). This plant is a most pernicious weed in cornfields. The flowers are large and daisy-like, and the foliage is very finely cut. The Mayweed is an annual, but it flowers from the early summer right into the winter. It is often found in association with the Corn Marigold. (Fig. 7.)

NETTLES. (*Urtica sp.*). Two of the indigenous Nettles are common enough to be classed as troublesome weeds. The Great Stinging Nettle (*U. dioica*) is a large, well-known plant. The rootstock is of a creeping habit and the plant is freely propagated in this way. Seeds are also produced in abundance, and it is well to note that the flowering time is from July to September. The Small Stinging Nettle (*U. urens*) is a much smaller plant than the last. It rarely grows to more than eighteen inches in height. This species is an annual.

PERSICARIA. (*Polygonum sp.*) The Common Knot Grass (*P. aviculare*) is often a troublesome weed. It has small narrow leaves and minute flesh coloured or whitish flowers. It is an annual that flowers all the summer. Another pernicious weed is the Climbing Persicaria (*P. convolvulus*). This plant has somewhat heart-shaped leaves and a climbing habit. The flowers are greenish white and these are produced all the summer. The Climbing Persicaria is an annual.

PLANTAIN. (*Plantago sp.*). Several of the Plantains are extremely common. One of the most abundant is the Greater Plantain (*P. major*). The broad egg-shaped leaves are very familiar, as are also the spikes of green flowers. The Hoary Plantain (*P. media*) and the Ribwort Plantain (*P. lanceolata*) are almost equally common. In the former the leaves lie so close to the ground that they destroy all vegetation. The species is easily distinguished by the light purple anthers of the flowers. The Ribwort Plantain is recognised by the lance-shaped leaves, which are strongly ribbed, and also the black flowering heads. Cattle are said to like the leaves of the Ribwort Plantain. When the flowers develop they are brown. All the Plantains mentioned are perennial.

POPPIES. (*Papaver sp.*). Although several species of Poppy are more or less common in this country only two have a widespread distribution. These are the Common Red Poppy (*Papaver rhaeas*) and the Smooth-headed Poppy (*P. dubium*). Both these species are annual and they are often extremely abundant, though the former is usually found in the southern and midland parts of the kingdom, whilst the latter is more common in the north. The scarlet flowers are produced in June and July, though the plants blossom over a long period, and are often found blooming quite late in the year.

RAGWORT. (*Senecio Jacobœa*). The common Ragwort is a tall handsome plant often growing two or three feet in height. The flower heads of bright yellow blossoms are very striking. The Ragwort is a strong growing perennial, and it is often extremely difficult to free pastures from this plant. The species blossoms all through the summer, and seeds are produced in large numbers.

SCORPION GRASS. (*Myosotis arvensis*). A plant belonging to the same genus as the Forget-me-Not. This is the commonest of all the species, and may be identified by the rough hairy covering of all parts of the plant. The stems rise to the height of from six to twelve inches, and bear small flowers of a bright blue colour. The flowering season lasts all the summer, and the Scorpion Grass is an annual.

SOW THISTLE. (*Sonchus oleraceus*). The Sow Thistle is a common annual plant, which grows from one to three feet in height. The leaves are oblong and often rather prickly. The plant has hollow stems and a milky juice. The flowers are yellow, and are produced in the summer: seeds follow in great abundance.

SHEPHERD'S PURSE. (*Capsella bursa Pastoris*). A common weed to be found in almost all parts of the world. The whole plant is more or less covered with hairs. In size it varies greatly according to the quality of the soil. The plant is an annual, but it is to be found in flower generally throughout the year.

SPEEDWELL. (*Veronica sp.*). Several of the Speedwells are troublesome weeds. One of the most abundant of the perennial species is the Common Speedwell (*V. officinalis*). The plants, as a whole, are hairy, and the leaves are oblong. The flowers are small, and of a pale blue colour. Two annual species which are extremely abundant, are the Ivy-leaved Speedwell (*V. hederfolia*) a plant with lobed leaves and pale blue flowers, with a curiously bent stalk when the fruit is set; and the Field Speedwell (*V. agrestis*) with heart-shaped leaves and a small blue flower borne on a slender stalk, which is almost as long as the leaves.

SPURREY. (*Spergularia rubra*). This is a small branching plant with rather fleshy linear leaves. The flowers are purple, varying to white. The plant is sometimes an annual and sometimes a biennial, and it flowers in the summer. It is often abundant in sandy fields.

THISTLES. (*Cnicus sp.*). Although most of the Thistles are serious pests, those belonging to the genus Cnicus are the worst of all. The strongest growing of the genus is the Spear Thistle (*C. lanceolatus*). In this case a strong tap root is developed which descends as far as twelve inches into the soil. The plant sometimes grows to the height of five feet. The flowers are dull purple and are usually produced alone, although on occasion two or three are grouped together. The Spear Thistle is a biennial; at the end of the season huge quantities of seeds are produced. As a rule in the first season this thistle developes merely a rosette of leaves which lie close to the ground. Another common species is the Marsh Thistle (*Cnicus palustris*). This is usually abundant in rather damp pastures, and is extremely difficult to eradicate. The plant grows from four to even ten feet in height, and at the summit bears clusters of small purple or white flowers. The foliage, which is very prickly, is often of a brownish colour. This thistle flowers in the summer, and is a biennial. Probably the most troublesome of all the thistles is the Creeping Thistle (*Cnicus arvensis*). This species is a strong growing perennial with certain peculiarities. The Creeping Thistle has two types of flower head; those which have abortive anthers producing no pollen, while in the others pollen-bearing anthers are present. These two kinds of flower heads are borne on separate plants. A popular impression amongst farmers is that the Creeping Thistle does not seed; this is quite an error for seeds are often freely produced. The plant, however, spreads largely by reason of its underground parts, and one plant will soon cover a wide area in this way. These roots often penetrate deeply into the soil. The Creeping Thistle dies down with the first sharp frosts. but the shoots come up freely in the spring. The height of the plant is about two feet, and the flowers are of a light purple colour. The Dwarf Plume Thistle (*C. acaulis*), although not so widespread as the other species mentioned, is often very abundant in localities where it is a most pernicious weed. The leaves grow close to the ground, and on account of the way in which they "star" out, seriously reduce the amount of pasturage in a field. (Fig. 8.) The Dwarf Plume Thistle bears a solitary purple flower, which is almost stemless. The species is a perennial.

VETCH. (*Vicia sp.*) Several kinds of Vetch are apt to be troublesome weeds, but the most common is the Hairy Vetch or Tare (*V. hirsuta*). This is a slender much-branched plant with tiny bluish white flowers. It is an annual and flowers all the summer.

WILLOW HERB. (*Epilobium montanum*). This species, known as the Broad Smooth-leaved Willow Herb, is sometimes very common in cultivated ground. It grows to the height of about a foot, has egg-shaped leaves and rose-coloured flowers. The seeds are produced in capsules the valves of which open lengthwise and release huge quantities of seeds adorned with cotton down. (Figs. 9 and 10.) The Broad Smooth-leaved Willow Herb is a perennial.

YARROW. (*Achillea millefolium*). This is an extremely common plant with somewhat hairy leaves, deeply cut. The flowers are small and may be white, pink, or purple. The stem is very tough and rises to the height of about a foot. The Yarrow flowers from the early summer until the late autumn.

# VII.—DUAL PURPOSE CATTLE.

*By K. J. J. Mackenzie, M.A., Reader in Agriculture in the University of Cambridge, and Director of the University Farm.*

No apology is necessary for introducing this subject at a time when national exigencies demand the utmost production, and when the prices paid for both milk and beef—cow beef more particularly—during the months of April, May, June and July of 1915 are remembered. Although this article only pretends to deal with simple facts, which anyone taking the necessary trouble could ascertain for himself, it may help, at this juncture in our national life, to call attention to the importance of the subject.

The first instance I will give to illustrate my point is that of a steer, bred from milking stock, forced out as baby beef at 14½ months old. His life history was as follows. He was born on the Cambridge University Farm on February 5th, 1914, the first sixteen weeks of life being spent on the pail and in being suckled. That is to say, milk happening to be plentiful, the steer received up to 1½ gallons of milk from the pail daily, and was then finished off on a cow that was tied up by the head while being milked out fat: the cow suckled a bull calf at the same time as this steer. The steer was weaned and turned out on May 16th, being then sixteen weeks old and weighing 2 cwt. 1 qr. 14 lbs. With two bull calves it ran in a small and well-shaded paddock. The grass not being good, the youngsters were thoroughly well fed with a mixture of one-third linseed cake, one-third bran, and one-third oats and other home-grown corn: towards the end of the summer some "cotton" cake was also used. The three calves received on an average 12 lbs. a day of the mixture just specified. They were closely observed, and the steer was believed to take his full share. In assuming that each calf consumed one-third of the feeding-stuffs, an observer could not pretend to any scientific exactitude.* But for field trials such an assumption seems justifiable when proper care is taken to see that each animal is getting a fair share. In this case, as ought to be the case on every well-managed farm, had bullying been apparent, either the bully or the weakling would have been removed. In ordinary farm practice, closer approximation in the field would become an intolerable burden. And it can safely be laid down that any farmer who may work out estimates with even this amount of accuracy will have far greater knowledge of the detail of the "costs" on his holding than will the man who ignores such rough methods of research because they are not scientific. It is understood that, unless otherwise stated, in this article the estimates of provender supplied to the calves running together are founded on the somewhat inexact method of division by three.

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* Since this article was written, an interesting illustration of this point has occurred on the Cambridge University Farm. A feeding-stuff, known to be somewhat distasteful to bullocks, was under trial with Herefords grazing a very fresh aftermath. My assistant, Mr. E. H. Powell, has put on record that one steer—out of fourteen—did not touch the cake in his tub till five weeks after his thirteen companions had been eating up their ration freely. This steer is now (September 25th) eating his share with the others.

From September 1st till February 23rd, 1915, the steer and the bulls were kept in a yard, with a shed attached. During these 24 weeks the steer received an *average daily allowance* of 12lbs. of hay and 14lbs. of roots, together with 4lbs. of cake and corn per day. The result of this treatment was that at the age of 54 weeks the steer weighed 6 cwt. 3 qrs. Unfortunately, through the exigencies of war carrying off many members of the staff, several other weighings are not to hand. The following is a statement of the steer's cost from birth till just over 12 months :—

| | s. | d. | | | |
|---|---|---|---|---|---|
| Cost as a calf* | | | £2 | 10 | 0 |
| First period of 16 weeks on milk at 5s. per week | | | 4 | 0 | 0 |
| Second period of 14 weeks at grass (cake and corn at pre-war prices) 2 stone per week of concentrated food at 11d., =1s. 10d., grazing 1s. per week, total 2s. 10d., say for the 14 weeks | | | 1 | 19 | 0 |
| Third period 24 weeks as "store" in yards— | | | | | |
| Hay, 12lbs. a day, 84lbs. per week (at 60s. a ton)† | 2 | 3 | | | |
| Roots, 14lbs. a day, say 112lbs. per week (at 10s. a ton)‡ | 0 | 6 | | | |
| Linseed Cake, 2lbs. a day, 14lbs. per week (£10 12s. a ton)§ | 1 | 4 | | | |
| Beans, 1lb. a day, 7lbs. per week(£9 6s. 8d. a ton) § | 0 | 7½ | | | |
| Bran, 1 lb. a day, 7lbs. per week (£7 7s. a ton)§, say | 0 | 5½ | | | |
| 24 weeks, say | 5 | 2 | 6 | 4 | 0 |
| 54 weeks' cost for food | | | 14 | 13 | 0 |
| 54 weeks' labour at 6d. | | | 1 | 7 | 0 |
| | | | £16 | 0 | 0 |

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* This was credited to the cow. As a matter of fact a dealer wanted the calf with the cow at this price.

† Could have been sold on the farm at this price.

‡ Cost to grow. § § § Prices paid.

|| Always a difficult thing to apportion per head, but this figure includes "cutting" roots and grinding cake.

The above statement shows that the steer cost approximately £16. His unfasted live-weight was then 6 cwt. 3 qrs. 0lb., so that, on food which was, for half this period, at war prices, he cost 47s. 4d. per cwt. live weight. The last weighing took place at a time when *lean* stores, as full of hay and water as feeding, after a long railway journey's fast, could get them, were making 50s. per cwt. on the markets. The steer also created a profitable market, for the hay made on the farm had paid a living wage for root growing, and had produced some farmyard manure in return for his litter. Had less expensive feeding stuffs been available he would have cost less. But the impossibility of securing delivery by rail prevented this economy.

The steer, now separated from his companions, was put up to fatten for another eight weeks and received daily :-

7lbs. concentrated (mixture as before)
14lbs. hay
28lbs. roots

At the end of this period of two months he weighed just under 7 cwt. 3 qrs. unfasted, and was sold for 11s.* a stone of 14lbs., realising £17 13s. 6d., or 45s. 6d. per cwt. live weight. The percentage of carcass to *fasted* live weight was, according to Lawes' tables (Lawes deducts 5·5 from unfasted weight for young moderately fat animals), 56 per cent., and the butcher who bought this bullock for a high-class trade expressed himself as thoroughly pleased with his condition, which was indeed admirable for so young a beast.†

It will be noticed that only £1 13s. 6d. was left for the eight weeks fattening period, or just over 4s. 2d. per week. The expenditure in food stuffs, however, *is very much less than* in the case of a large animal put up at from 2 to 2½ years old. And it has been shown over and over again‡ that the increase in live weight per week will be about the same with the larger bullock. Further, with the larger animal, even if bought in as a *fresh* store, the feeding period would last at least twice as long. It may be said of this particular animal that he paid for himself throughout a life of 54 weeks and returned some six tons of good dung to the farm at very little over the cost of his litter. Besides which, such a carcass is economical from the national point of view, no food having been wasted on "sustenance" alone. That is to say the minimum amount of fuel for life production was used up while meat was manufactured in the animal's body. And this has been done while the dam and the sire's dam were again giving food for the country in the form of milk.

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* The price would have been ½d. per lb. more, the highest price made on the market, had the steer been sold in the public sale for the London market, but it was felt desirable to ascertain percentage of dead to live weight and inspect the carcass.

† The beef was of excellent flavour as was ascertained from some of the butcher's customers.

‡ See *Journal of the Board of Agriculture* for 1908, p. 253, No. 4. "The Cost of Producing Beef in Winter," by K. J. J. Mackenzie ; and the *Journal of the R.A.S.E.*, p. 82, "The Cost of Winter Grazing in East Norfolk," by M. C. H. Bird.

A consideration of the breeding of this animal will demonstrate the truth of the last assertion. His sire was a home-bred pedigree Shorthorn, whose dam, though small, is an 850 gallon cow. This bull's sire was again out of a good milker, and is himself the sire of good milking heifers. Though the parents of this home-bred bull were both good specimens, closely related to show winners, they were not high-priced stock; merely good dual-purpose Shorthorns of high breeding. Without troubling the reader with figures, it may be said they were bought at auction, from ring-sides surrounded with farmers, at about 7 per cent. more than commercial market value. They bred the sire of the steer in question, whose value, at present-day prices, when about eighteen months old, can with confidence be estimated at about thirty-five guineas at public auction.

The mother of the steer had no pedigree, but was of Shorthorn type. She was bought in to make up the milk to "contract" amount. She was good-looking but *small*, and decidedly thin-fleshed. The following is her milk record :—

| | | | | | |
|---|---|---|---|---|---|
| Calved | 2nd calf | 22 : 10 : 10 | Yield to | 31 : 9 : 11 | 6,983lbs. |
| ,, | 3rd ,, | 11 : 11 : 11 | ,, ,, | 31 : 9 : 12 | 7,333lbs. |
| ,, | 4th ,, | 5 : 10 : 12* | ,, ,, | 31 : 9 : 13 | 8,837lbs. |

This thin-fleshed heifer put to a mongrel bull of neither shape, frame nor breeding, would most assuredly have bred a "toast-rack" type of steer that could only have been a loss to the nation as well as to its unfortunate owner. Put to a decent bull, she bred the steer whose life history we have tried to describe. The thousands of steers bred from these mongrel bulls mated with thin-fleshed milkers are surely a severe handicap to the corn-grower, who has to rely on them for farmyard-manure making. Their sisters are only too often poor milkers, and I would ask those who are unfortunate enough to have to rear such steers for the feeder to consider how many months' keep it would take to make them reach the weights I have quoted. Does not the present crisis in our national history demand that all cattle, not specially bred for butter-production, should be able to give as good results as the animal whose history I have ventured to put on record? Fortunately, the Development Money is helping very many owners of small lots of cows to get the services of good sires at a perfectly reasonable fee. And so it can be confidently hoped that such cattle will become the lowest quality aimed at by any one wishing to be thought an up-to-date farmer.

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* Owing to the bull used in the herd at the time proving sterile, this cow did not calve again till February 4th, 1914. She was then sold to a neighbouring urban milk farmer, who says "she is the best milker" he has ever owned. Unfortunately her owner keeps no records.

## ANOTHER TYPE.

A much less desirable type of dual purpose animal has just come within the writer's experience. The animal was an exceptionally well-bred Shorthorn sire. While out of a good milking dam he was by a bull whose sire was " pure beef " though his maternal grand dam was again a heavy milker. The bull was thus " milk " on his mother's side and " beef " *and* " milk " on the sire's side.

The animal in question was an extraordinary " good doer." From the age of seven years and five months till eight years ten months, he was kept in condition, while in constant service, on 16lbs. of hay and 28lbs. of root per diem. No other food was given except a bran-mash (about 3lbs. of bran) and a pint of linseed oil once or sometimes twice a week. This mash and oil, together with plenty of exercise, were given in order to keep down the " paunch " trouble which so many old bulls are often threatened with. In spring and summer, the roots and part of the hay—but only part—were replaced by their equivalent in green soiling (*i.e.*, 4lbs. green soiling replaced 1lb. of hay). On the 14th of February the old bull was put up to fatten. He then received, in addition to the above, a ration of 2lbs. of linseed cake and 14lbs. of mangel. On March the 9th he had a further 2lbs. of linseed cake and 14lbs. of roots, and again, on March 23rd, 2lbs. more linseed cake added to the daily ration. On this ration—6lbs. linseed cake, 16lbs. of hay, and 56lbs. of roots, the bull lived till April 24th—under five weeks—on which date he weighed, unfasted, 21cwt. 3 qrs. at the age of nine years. This sire was then sold to a dealer for £40, who sold him again to a butcher to " cut up " in a shop. If this performance does not speak for itself, there are many breeders, feeders, and dealers who can testify to the flesh carried by this old animal on the rations specified. The unfortunate feeder of an old mongrel should consider how many pounds of cake and corn it would take to get such a bull good enough for a butcher's shop?

Unfortunately, however, this bull had the quality of getting not only heifers good for "milk and beef" but also those that were *only* good for the butcher and of no use at the pail. This sire was probably what those working on the science of heredity call a "splitter." By the kindness of a former owner we are able to show how this "splitting" among his heifers took place when the bull was mated with good deep-milking pedigree Shorthorn cows.

(*a*) Heifer whose dam's best record was 1,130 gallons in 330 days.
Calved first calf May, 1914, when 3 years and 1 month old.
Milk yield with first calf, 359 gallons in 194 days.
Sold fat in a provincial market (March, 1915), for £36 15s. 0d.

(*b*) Heifer whose dam gave 788 gallons in 292 days.
Calved first calf April, 1914, when 3 years old.
Milk yield with first calf, 582 gallons in 305 days.

(*c*) Heifer whose dam gave 1,070 gallons in 356 days, and was a medal winner at the London Dairy Show Milking trials.
Calved first calf in October, 1913, when 3 years and 2 months old.
Milk yield 589 gallons in 276 days.

(*c* 1) *Own sister to above.*
Calved in due course, and was so bad a milker that she was forthwith fattened off and sold to butcher.

(*d*) Heifer whose dam gave 837 gallons in 305 days and bred a 300 guinea bull by the sire under consideration.
Calved her first calf on May 10th, 1913, when 2 years and 10 months old.
Gave with first calf 510 gallons in 341 days.
Gave with second calf 519 gallons in 269 days.

The heifers (*b*) and (*c*) may be said to be very promising as this class of cattle go, and have been retained in the herd; (*a*) and (*d*) are doubtful; whilst (*c* 1) and others "not worth recording," according to their proprietor, have been found to be *very bad*, and were fed off at once for the butcher. Others, got by the bull, are obviously good milkers, though their owners keep no records, while there are again others obviously bad.

In using such a sire as this, the man who is dependent upon a supply of home-bred heifers to keep up a dairy herd may be greatly inconvenienced, for often he has room only for the rearing of a few heifer calves bred from his best milkers. However good all these may be for the butcher, it seriously handicaps the owner of any such bull if 50 per cent. of the heifers are useless at the pail, especially so at a time when every " bag " is wanted to keep up a supply of milk guaranteed under contract.

Another difficulty is to know whether it is safe to use the male offspring of such a bull for future breeding in the herd. Wilson, if we read him aright,* seems to indicate that one is sufficiently safe-guarded in doing so by having a very exceptional milk-record on the dam's side. Probably, under existing circumstances in this country, such breeding is all we are likely to be able to obtain without undue expenditure in purchasing a sire. But it is the writer's object to show that, when breeding dual purpose animals, it becomes imperative to ascertain as much as possible about the performances of the bull's female ancestors. The study of the breeding-results obtained by using such sires as the one quoted should convince farmers of the necessity of keeping milk-records—that is to say if it is desired to purchase bulls which are entirely " dual-purpose " at a figure within the reach of the ordinary tenant-farmer. Three generations of milk-records would prevent there being a bad-milking great-grandmother to *split back to*, and with four generations the likelihood is remote in the extreme of the sire carrying any " *pure-beef* " blood. The Officers of the Board of Agriculture find that milk-records cost about 5s. per cow per annum. Half of this is paid out of " Development " money. Is the price too high to pay to *insure* " milk-getting " sires ?

# VIII.—AGRICULTURAL EDUCATION IN NEW SOUTH WALES.

*By Thos. E. Sedgwick.*

As retrenchment and reform will doubtless be two of the leading demands after the war, it may not be inopportune to describe what has been, and is being, done by the Mother State of Australia to educate her youth in agricultural affairs, with a view to retaining many of those on the land who would otherwise drift back to the town and inducing many of those in the towns to take to the land.

The Government of the State of New South Wales is the only one in the British Empire which has a complete system of training for their boys. In this country delinquency or pauperism are the qualifications to assure a boy being admitted to one of the Government training farms; none of which are for the unimpeached messenger, office-boy, house-boy, or factory-worker. The same, moreover, applies to training ships, the only examples of which for respectable boys of good character are conducted by private subscription. It would be a great thing if some of our larger landowners were to institute a similar training farm especially for town boys who wish to acquire some of the rudiments of agricultural procedure before entering the service of an employer. No better form of memorial to some of our heroic dead could be imagined than thus helping to develop the country for which they died, and the securing the prosperity of many of its younger inhabitants. Such a scheme, and its beneficiaries, could be named after him in whose honour it was founded; and his fame and example would thus be kept green and reverberate throughout the Empire long after monumental inscriptions had mouldered or become defaced.

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* See *Journal of the British Dairy Farmers' Association* for 1915, p. 82. " The Elimination of the Unprofitable Cow," by Professor James Wilson, M.A., B.Sc. (Royal College of Science, Dublin).

## GOSFORD AND MITTAGONG.

It must not be supposed that the delinquent children, who are generally more sinned against than sinning, or whose superfluous energies have been misdirected, are neglected in this progressive State. Far from it. For many years such children have been sent from the Children's Court to the Homes at Mittagong, where a series of bungalows provide accommodation for boys and girls who need removal from their former environment. Here the older boys are taught smithing, carpentry, fruit growing, poultry-raising, dairying, and general farm and garden work, including irrigation by overhead methods. At the same time, they attend the local school with the children of the neighbouring settlers. After a period here, they are released on probation and are regularly visited by the State officers.

Other boys were formerly committed to the Training Ship "Sobraon," or the Brush Farm Reformatory. As both these were deemed unsuitable, it was decided to combine them in a larger institution situated at some distance from a town. This is a further example of concentration, with reduction in cost and increase in efficiency, which we should do well to emulate in the Mother land.

An area of 700 acres of Crown land, situated at Penang, near Gosford, New South Wales, was selected, which offered the advantages of a lofty and healthy site with beautiful natural surroundings a good soil and ample water supply.

The lowest tender for clearing the virgin "bush" (or forest) being £20 an acre, the work was entrusted to a party of the boys under suitable supervision. The boys revelled in the life under canvas and in the work, which, besides being done at the lowest possible cost, afforded valuable experience to the lads; and a similar scheme of practical instruction in building and dam-construction followed. As only 40 of the 700 acres of the estate have been cleared, the whole property will continue to provide excellent practical instruction suitable to the needs of the lads committed to the Institution, many of whom will thus learn the rudiments of pioneering, and so be able to apply their surplus energies to national development.

## RURAL EDUCATION IN PRIMARY SCHOOLS.

For children who have not come under the influence of the Children's Court a complete system of agricultural education is offered, extending from the primary school to the University, in a series of five steps or grades, as we shall describe, merit being the sole qualification, irrespective of means.

For at least the last ten years, the question of interesting school boys in rural life has received careful attention at the hands of the Minister of Education in New South Wales. In 1905 an Instructor in school education was appointed to direct the work of the primary school teachers. He possesses the dual qualification of a thorough knowledge both of agriculture and of school methods, and he has to visit schools in the interest of school agriculture and to supply teachers with information required to direct the working of the pupils. The Department makes grants of seeds for school gardens, and has installed windmill plants to provide adequate water supply. They have also initiated a system of Rural Camp Schools in different centres, where metropolitan school boys and their teachers, every spring and autumn, can become familiarised with the important rural industries of the State, and a distinct inclination towards rural pursuits is thus engendered. Of the thirty thousand school boys attending the public schools of Sydney, in some years as many as fifteen hundred participate in the benefits of these camps; a large proportion of the remainder are too young to do so.

At twenty-two district schools, agricultural science classes are held, milk testing is taught and scientific experiments in agriculture are conducted; and a two-year diploma course in agriculture is provided for every student at the Central Technical College at Ultimo, Sydney. This far-sighted State policy of directing the attention of boys to the fundamental industry of the Commonwealth has resulted in an extended desire among them to continue their education in a rural direction.

## HURLSTONE AGRICULTURAL SCHOOL.

The Department of Agriculture has, therefore, inaugurated an Agricultural High School at Hurlstone, a few miles out of Sydney, which stands in twenty-six acres of ground, used for teaching both practical and experimental agriculture. The equipment includes class-rooms, laboratory, manual-training and blacksmiths' shops, dairy, silo, and the usual farm buildings. The objects of the institution are to ground the boys thoroughly in agriculture and at the same time to carry on their education in English, with special attention to science and the development of scientific methods. Thus general culture and practical knowledge go hand-in-hand.

Boys go on to Hurlstone direct from the primary schools at fourteen years of age. No fees are charged to day students, but boarders pay £6 6s. 0d. a quarter. Bursaries and scholarships are given freely by the Government to deserving boys, and in the third and fourth year their scholarships are tenable at the Hawkesbury Agricultural College, on due progress having been made at Hurlstone. The two years at Hurlstone count as one year for the Diploma Course at the College, and the scholarships thus enable the students to gain their Diploma.

Three leaving-scholarships are awarded annually to the most successful boys. These are tenable at the Hawkesbury Agricultural College, where Hurlstone boys are always well represented in the first, second, and third places on the list and among the prize winners.

The general results are more than satisfactory, as out of 190 students who have passed through the school, 157 have taken up agriculture as their life's work, and only 33 have changed their minds as regards their profession.

## GOVERNMENT EXPERIMENTAL FARMS.

The students from the Hurlstone Agricultural High School and other schools, especially older lads and farmers' sons, frequently enter the Government experimental farms and schools, of which there are a dozen in different parts of New South Wales. Here practical experiments on a commercial scale are carried out with different varieties of sheep, wheat, fruit and other crops and stock suited to the district. Several new varieties of wheat, specially adapted to the climatic and soil conditions of the locality, have been raised on these farms. Experiments with pens of 50 or 100 sheep under each cross or system of feeding, and with wheat-growing under various manures, thick or thin sowing, deep or shallow cultivation, with other investigations, carried out on a large scale, give a commercial aspect to the results obtained. Most of these farms are some thousands of acres in extent, and in some cases are not yet fully cleared; thus the students have experience of the practical methods of clearing and of cultivating the partially cleared areas.

All these farms take students at rates of pay averaging about £12 to £20 per annum, to include board and lodging and lectures. The students do all the work themselves, under the direction of the Staff, who are both practical and experienced in their own branch of agriculture, and capable lecturers. If a student conducts himself well, he is allowed the option of a second year's training free of charge.

Special facilities are given to ex-students from these farms, as well as from Hurlstone, to attend at Hawkesbury for two years, instead of three, in order to gain the College Diploma.

## HAWKESBURY AGRICULTURAL COLLEGE.

The primary channel of agricultural education in the State is the Hawkesbury Agricultural College and Experimental Farm, founded in 1891, near the town of Richmond, 38 miles from Sydney. It is essentially a collegiate establishment, 200 students being able to pursue their studies there. The complete course extends over three years, and is a thorough exposition of: "Practice with Science." The fees for the three years amount to a total of £69; but extra-State students are charged £30 additional, which is, however, repaid twelve months after the conclusion of the course upon the production of satisfactory proof that the student has settled permanently in New South Wales. A few non-resident students are charged £2 2s. 0d. per annum for tuition. The minimum age is 16; those students who have already spent two years at Hurlstone Agricultural High School, or at one of the Farm Schools, entering as second year students.

Practice is afforded under competent direction in the production of almost every crop known to temperate and sub-tropical regions. One thousand of the 3,440 acres are under cultivation. An average yearly cultivation would consist of 140 acres of wheat, 180 acres of fodder crops, 140 acres of oats, 125 acres of maize, 28 acres of sorghum and other green food, 40 acres of orchards, and smaller *acreages* of minor crops. One hundred acres are devoted to experimental work in crop production. A branch farm of 116 acres on the banks of the Hawkesbury River is carried on under irrigation, the vegetable garden of the college being also irrigated from the septic tank of the institution's sewage system.

The training is both systematic and thorough, alternate days being spent in class-room and field work. The ploughing, cultivating and harvesting of crops, milking, tending to the stock and shearing, have all to be done by the students themselves without favour or distinction. As, in a sparsely populated country like Australia, farmers have to be able to do many things which in towns or more closely settled areas are entrusted to qualified tradesmen, the students at Hawkesbury undergo a complete technical instruction, including the erection of buildings, the laying of concrete floors, the construction of roofs, soldering of iron and tin ware, mixing and using of paints, carpentry and smithy work of all kinds, and the making and repairs of saddlery. They are also instructed in the care and management of boilers, steam, oil, and gas engines, the use of electric motors for farm work, elementary repairs, plumbing, and screw cutting. The egg-laying competitions at Hawkesbury are of world-wide renown; and ostrich farming is also taught. The annual Conference of Poultry Breeders is held at the College, and no less than 600 persons attended in 1914.

Compulsory military training for national defence is carried out during the college course, and athletics, sports, swimming and rifle practice are by no means neglected. The Christian Union is conducted by the students themselves.

At the conclusion of the course, students can enter the University Department of Agriculture with bursaries which give everyone with ability an equality of opportunity, but successful students on leaving receive a Diploma in Agriculture, and are distinguished by the letters H.D.A.

A two year's course is also held at the college for the Hawkesbury Diploma in Dairying (H.D.D.). Other sectional courses include one of a year's duration in Orcharding, and others of six months in Pig and Poultry management.

During their second year, a special train is chartered to take students to different districts under varying conditions of agriculture, where they visit the local experimental farm and typical holdigns. Excursions are also arranged periodically to other farms, studs and herds, implement works, butter factories, and other cognate establishments.

## UNIVERSITY OF SYDNEY—DEPARTMENT OF AGRICULTURE.

Like other new countries, Australia devotes more attention to useful sciences than to dead languages. A Department of Agriculture was inaugurated a few years ago in the University of Sydney, and R. D. Watt, one of the first winners of the National Diploma in Agriculture (the gold medal of which he gained), was selected as the first holder of the Chair of Agriculture. As, after a distinguished career at Glasgow University and the West of Scotland Agricultural College, he did research work at Rothamstead, and held an important Government appointment in the Transvaal, a better selection could hardly have been made either from an academic or a practical point of view. Other lecturers and demonstrators have been appointed in order to provide for a complete curriculum. The course is spread over four years, and the students are encouraged to spend their vacations at the agricultural experimental farms, and are advised to visit different centres each year in order to become practically acquainted with the different soils and conditions in the various localities. This enables them, after passing the academic examinations, to qualify for the Degree of Bachelor of Science in Agriculture, which is only granted on the candidate producing evidence of having spent at least twelve months—which need not be continuous—at such an institute, where they have been engaged in practical field operations. If, therefore, they have done practical work for the three months' vacations during the four years' course they get their degree as soon as they pass their final examinations.

The University is entirely undenominational, but residential colleges have been established in connection with certain religious denominations for the association of students in the cultivation of secular knowledge.

The University has received private benefactions during the past half century, including many gifts in kind and endowment funds, amounting to £547,165; the income from which amounts to about £25,000. In order to keep down the expenses of study, the University is also endowed by the State to the amount of £20,000 a year, with proportionate increases of £1, for each fifteen persons between the ages of 17 and 20 added to the population of the State, as determined by census records. The cost of matriculation is £2, and the total fees for the various courses of instruction, therefore, only amount to £83 15s. 0d. spread over the four years, and the examination fee for the Degree is £3, reduced to £2 for re-examination in case of failure. For students of ability but possessing insufficient means, public exhibitions are authorised to be awarded in the proportion of one for every 500 persons between the ages of 17—20 in the State. These cover the cost of matriculation, tuition, and degree fees. Thus everyone has equality of opportunity in education and for competing for the many and increasing public appointments of value which require the services of trained men.

## TRAINING FARMS FOR BOYS.

This Government also tried, some years ago, the experiment of placing loafers and other unemployed men on a labour farm, which was, however, not altogether a success, as the men turned out to be generally work-shy. They, therefore, converted the Pitt Town Farm, situated about 25 miles from Sydney, into a Boys' Training Farm, where local town boys could obtain a preliminary acquaintance with farm life. As, however, the young Australian who has once tasted the sweets of town life is generally disinclined to take up a rural career, the facilities are largely confined to immigrant boys from the Old Country. On this farm, there are about 300 acres under plough and 50 acres under fruit, a large herd of dairy cows, a dairy where the milk is separated and the butter made up, silos for both lucerne and maize ensilage, several hundred head of poultry, and horses and sheep and pigs in proportion. These enable the boys to become accustomed to country life before they are separated into units. Immigrants have also the additional advantage of recovering their muscles and getting over their home sickness before seeking work with an employer. The cost of the training, after allowing for the sales of surplus produce of the farm, amounts to about five shillings per head each week.

## SHORTER COURSES.

Every year short courses of study and practice in various branches of rural industry are held in different parts of the country. A short Dairy Science course for managers of butter and cheese factories and their assistants is held annually at different centres. This has resulted in a great improvement in cream grading and in the finished product. The official Dairy Instructors not only inspect the dairy farms and factories, many of which are re-constructed as the result of these visits, but they also deliver lectures in dairying and conduct a monthly test of the butter-producing capacity of registered cows, and thus practically show the necessity of culling cows which do not pay for their own keep.

"Winter Schools" for farmers and their sons are held at one or two centres annually, where the subjects of the lectures and demonstrations include—Principles of Agriculture, Rearing and Care of Stock, Dairying, Book-keeping, Bacteria and Fungi. Similar schools are held during the summer vacation for State school teachers. As agricultural subjects are being taught more and more in the schools, this instruction is invaluable.

## PUBLICATIONS.

Valuable educational work is done through the publications section of the Agricultural Department.

The circulation of the *Agricultural Gazette* of the State now amounts to 15,000 copies a month, and about 40,000 reprints of *Gazette* articles are distributed annually. The *Farmers' Bulletins* contain all the information available to date on their subjects and 30,000 of these are asked for each year. Their range includes such subjects as:—Rearing Queen Bees, Feeding Farm Horses, De-tailing(docking) Lambs, Cauliflower and Cabbage Cultivation, Egg-laying Competitions. The demand for the *Science Bulletins* only amounts to about a thousand copies a year, partly, no doubt, on account of the proportion of scientifically-educated farmers being at present comparatively small.

Other publications include: "The Fruit Growers' Guide," "The Soils of New South Wales," "Pruning," "Testing Milk and Cream," "The Farmer's Handbook" and "Guides to the Experimental Farms."

## MISCELLANEOUS.

Space prevents due honour being paid to other less direct work in Agricultural Education in New South Wales. The State Botanist supervises seed-testing and distribution, together with the organisation of farmers willing to co-operate in experiments with grass and fodder plants, and also gives advice concerning pastures and identification of specimens.

The entomologist's services include lectures in connection with the Agricultural Bureau, of which 64 branches already exist, with a membership of 2,216. The educational value of this movement cannot be over-estimated; and the appointment of a special staff of peripatetic lecturers, therefore, is already being considered, as the work promises to extend beyond the ability of the scientific staff to cope with in addition to their routine duties.

The Chemist's department deals with soils, waters, and fertilizers, nitrification, the isolation of the poisonous principle of reputed poisonous plants, the testing of the milling and baking values of wheats, and the soils of the State. It also makes exhibits at various agricultural shows, grants subsidies to approved agricultural societies, and administers the Rabbit, Quarantine, Vine, Vegetation Diseases and other Acts.

A great feature of the system is undoubtedly the distribution of experts and trained workers who, with the cadets and students, form a network of agricultural knowledge similar to the circulatory system of the human body; no part is missed or neglected, and a fresh supply is ever being created, which moves from point to point as the body politic most needs.

## CONCLUSIONS.

Whilst the State of New South Wales has had the advantage of the example of the Old Country to show them what to avoid doing, they have given us some good examples of what can be done to develop the agricultural resources of the land. The expenditure, although large, more than repays its cost indirectly by the increase of the national wealth.

The outstanding advantage of the method pursued by the Government of this State is the uninterrupted opportunity it affords for the deserving student, showing himself successively proficient and diligent, to proceed from the primary school to the Agricultural High School, next to the Experimental Farm and School, and afterwards to the Hawkesbury Agricultural College. Thence he can proceed to the University and obtain a Degree of B.Sc. in agriculture, and thus qualify for a Government Inspectorship or other appointment.

# BATH & WEST & SOUTHERN COUNTIES SOCIETY.

## PLAN OF SHOW YARD,

## WORCESTER, 1915.

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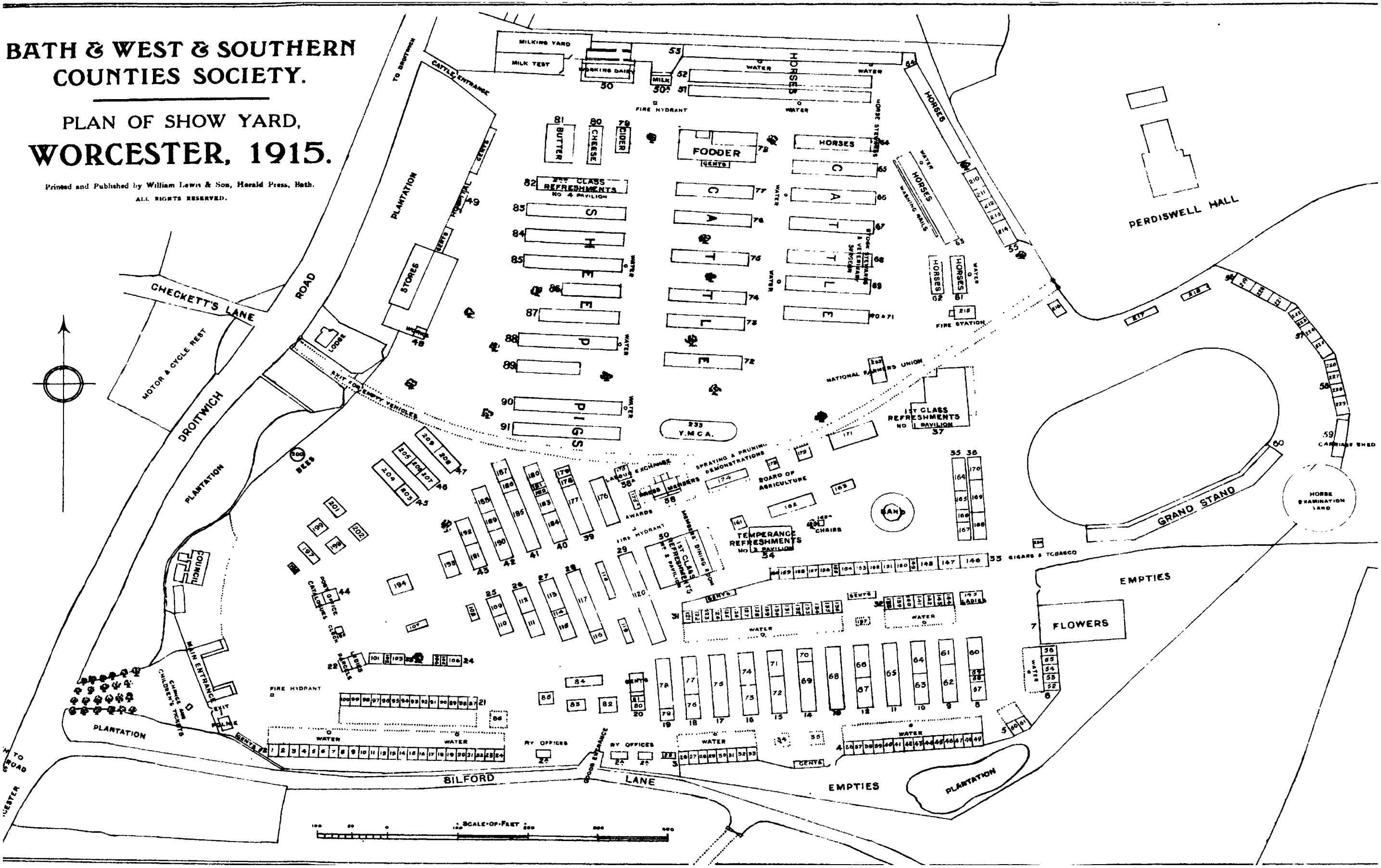

## IX.—THE SOCIETY'S EXHIBITION AT WORCESTER.

*By Thos. F. Plowman, Secretary and Editor.*

The Society's 1915 exhibition at Worcester was opened on Thursday, May 20, and closed on Whit-Tuesday, May 25. The special circumstances under which the Show was this year held are detailed in a separate article on " The Society and the War," appearing on pages 1 to 15 of this *Journal.*

The Show was inaugurated by the Mayor of Worcester (Alderman H. A. Leicester), who attended in State, accompanied by his Chaplain (Father Field), the High Sheriff (Mr. A. Carlton), the Chamberlain (Mr. W. Moore), the members of his Corporation and their officials, and the Local Executive Committee. The Chairman of the Worcestershire County Council (Mr. J. N. Willis Bund), also joined in the official welcome to the Society.

They were received by the President (The Earl of Coventry), the Vice-Presidents, and Members of the Council of the Society, and of the Herefordshire and Worcestershire Agricultural Society.

In receiving the Mayor and Corporation, the President said that some 35 years had elapsed since Worcester had the privilege of entertaining the Society, and it was pleasant to know that the entries on the present occasion were nearly double what they were in 1880. He assured them that the Society felt that it was an honour for the Show to be inaugurated by the Mayor and Corporation, and by the Chairman of the County Council.

The Society's Secretary then read the resolution of the Council of the Society inviting the Mayor to inaugurate the Show.

The Mayor said he had the greatest pleasure in being present in his official capacity to welcome the Society to that Ancient and Faithful City, and to inaugurate the Show. When the question of holding the Show at Worcester was first mooted the suggestion was received with enthusiasm, because many of them, who remembered when the Show was held there in 1880, knew what benefits were derived from the visit on that occasion by the City and County and Agriculture generally. Certain unfortunate happenings had taken place since that time, and everything had been more or less changed. It was no longer necessary to remind the people of the County that Agriculture was the greatest of all industries, and that much of the machinery manufactured in this country was sent abroad for the development of Agriculture. Although the great European upheaval had caused a certain amount of interference with the combination of business and social enjoyments and had prevented the City and County doing all they had hoped to do had the times been normal, they were delighted to do what they could to further the business side of that interesting Show and thereby to assist Agriculture to which they owed so much. He only regretted that it had fallen to the lot of Worcester to have the Show at such a time: if one could have chosen a time, he would have liked it to have been the first year after the declaration of Peace. However, they had to carry on as best they could. He welcomed the Society, and was gratified by the number of members of the Corporation who had attended. It showed they were at one with himself in the belief that municipal bodies should do all they possibly could to help these shows, without which the agricultural industry would be very much behind what it was. He was glad that Lord Coventry had again been able to accept the Presidency of the Society, and they welcomed him with all their hearts.

Mr. Willis Bund, on behalf of the Worcestershire County Council, said they had to thank the Bath and West Society for holding its Show there. When there was some idea of putting off the Show many of them thought it better that it should be held, whatever the result, for if "Business as usual" could be said of anything it should be in respect of the business of Agriculture. The County was very glad to see the Show at Worcester and they could only hope that, notwithstanding the circumstances, it would be most prosperous. The attendance of visitors from a distance could not be expected to be so good as usual, owing to the lack of railway facilities, and therefore there was the greater need for the county people to support the Show in every way possible.

The Earl of Coventry cordially thanked the Mayor and Corporation and the Chairman of the County Council for their kind and hearty welcome to Worcester and also the Local Committee for their efforts to promote the success of the Show. Cheers having been given for the Mayor and Corporation and the Earl and Countess of Coventry, the proceedings terminated.

## PLAN.

A plan showing the situation and arrangement of the Yard faces this report.

## ENTRIES.

The following is a comparative statement of the entries in the Stock and Produce Classes in 1876, when the Show was held at

Hereford, and in 1880 and 1915, in each of which years the Show was held at Worcester.

| | Hereford, 1876. | | Worcester, 1880. | | Worcester, 1915. | |
|---|---|---|---|---|---|---|
| HORSES :— | | | | | | |
| Agricultural .. .. .. .. | 31 | | 49 | | 65 | |
| Hunters, Hacks, Ponies, Harness and Jumping .. .. .. .. | 101 | | 50 | | 279 | |
| | — | 132 | — | 99 | — | 344 |
| CATTLE :— | | | | | | |
| Devons .. .. .. .. .. | 26 | | 22 | | 11 | |
| South Devons .. .. .. .. | 0 | | 0 | | 22 | |
| Shorthorns .. .. .. .. | 55 | | 81 | | 96 | |
| Herefords .. .. .. .. | 118 | | 57 | | 79 | |
| Sussex .. .. .. .. .. | 34 | | 36 | | 4 | |
| Aberdeen-Angus .. .. .. | 0 | | 0 | | 29 | |
| Jersey .. .. .. .. .. | 26 | | 42 | | 70 | |
| Guernsey .. .. .. .. | 21 | | 33 | | 54 | |
| Kerry and Dexter .. .. .. | 0 | | 0 | | 28 | |
| Dairy .. .. .. .. .. | 0 | | 0 | | 20 | |
| | — | 280 | — | 271 | — | 413 |
| SHEEP.. .. .. .. .. .. .. | | 178 | | 185 | | 213 |
| PIGS .. .. .. .. .. .. .. | | 104 | | 113 | | 84 |
| FARM PRODUCE :— | | | | | | |
| Cheese .. .. .. .. .. | 0 | | 0 | | 39 | |
| Butter and Cream .. .. .. | 0 | | 0 | | 74 | |
| Cider and Perry .. .. .. | 32 | | 0 | | 56 | |
| | — | 32 | — | 0 | — | 169 |
| | | 726 | | 668 | | 1,223 |

A list of the awards, names of the Judges, etc., will be found on pages *i* to *lxiv* of the Appendix to this volume.

## PRIZES.

The money prizes in 1915 were contributed as follows :—

| | £ | s. | d. |
|---|---|---|---|
| Bath and West and Southern Counties Society .. | 2,552 | 5 | 0 |
| Herefordshire and Worcestershire Agricultural Society | 257 | 0 | 0 |
| Shire Horse Society (or Medal) .. .. .. | 15 | 0 | 0 |
| Devon Cattle Breeders' Society .. .. .. | 10 | 0 | 0 |
| Shorthorn Society .. .. .. .. | 20 | 0 | 0 |
| Dairy Shorthorn (Coates's Herd Book) Association .. | 10 | 0 | 0 |
| Hereford Herd Book Society .. .. .. | 20 | 0 | 0 |
| English Aberdeen-Angus Cattle Association .. | 10 | 0 | 0 |
| English Guernsey Cattle Society .. .. .. | 20 | 0 | 0 |
| English Kerry and Dexter Cattle Society .. .. | 15 | 0 | 0 |

| | | | |
|---|---|---|---|
| Shropshire Sheep Breeders' Association and Flock Book Society | £15 | 0 | 0 |
| Kent or Romney Marsh Sheep Breeders' Association | 17 | 0 | 0 |
| Southdown Sheep Society | 17 | 0 | 0 |
| Hampshire Down Sheep Breeders' Association | 10 | 0 | 0 |
| Oxford Down Sheep Breeders' Association | 10 | 0 | 0 |
| Dorset Horn Sheep Breeders' Association | 15 | 0 | 0 |
| Dorset Down Sheep Breeders' Association | 15 | 0 | 0 |
| Ryeland Flock Book Society | 15 | 0 | 0 |
| Kerry Hill (Wales) Flock Book Society | 20 | 0 | 0 |
| British Berkshire Society | 5 | 0 | 0 |
| Large Black Pig Society | 12 | 0 | 0 |
| Worcestershire County Council | 15 | 0 | 0 |
| Gloucestershire County Council | 15 | 0 | 0 |
| Herefordshire County Council | 15 | 0 | 0 |
| | £3,125 | 5 | 0 |

Gold, Silver and Bronze Medals were also given by the Society, and Medals or Plate by the Shire Horse Society; the Hunters Improvement and National Light Horse Breeding Society; the Hackney Horse Society; the National Pony Society; Chas. A. Hanson, Esq.; the South Devon Herd Book Society; the Sussex Herd Book Society; the Aberdeen Angus Cattle Society; the English Aberdeen Angus Cattle Association; the English Kerry and Dexter Cattle Society; and the Southdown Sheep Society.

## IMPLEMENTS.

The following is a comparative statement of the number of feet run of shedding provided for implements, machinery, etc., and of the number of square feet of open space occupied by exhibits unsuitable for shedding :—

| | | Hereford, 1876. | Worcester, 1880. | Worcester, 1915. |
|---|---|---|---|---|
| Machinery in Motion | feet run | 1,106 | 1,190 | 1,260 |
| Agricultural Implements | ,, | 4,887 | 4,759 | 2,295 |
| Other Exhibits not strictly Agricultural ,, | ,, | 1,070 | 1,410 | 270 |
| Seeds, Cattle Foods, Artificial Manures, &c. | ,, | 788 | 756 | 1,055 |
| | | 7,851 | 8,115 | 4,880 |
| Open space for Farm and Horticultural Buildings, &c. | square feet | 9,720 | 9,792 | 16,367 |
| | | 17,571 | 17,907 | 21,247 |

## MISCELLANEOUS DEPARTMENTS.

In a lofty pavilion specially constructed for the purpose, there was a choice display of exotic plants and flowers, arranged mainly with the view of illustrating the beautiful effects which could be obtained by skilful groupings and combinations of colour.

Near the Board of Agriculture Pavilion, demonstrations of tree-pruning, grafting and spraying, were given daily by Mr. J. Ettle, F.R.H.S., and the Worcestershire Bee-keepers' Association provided demonstrations and practical instruction each day in bee-keeping.

The Board of Agriculture and Fisheries, and also the Labour Exchange, had pavilions for the purpose of affording opportunity to agriculturists and others to confer with their officials upon any points of mutual interest, while the Worcestershire and Herefordshire branches of the National Farmers' Union were allotted space for the erection of a large tent for the accommodation of their members and friends.

A fully equipped Working Dairy, in which the Buttermaking Competitions were held, formed, as usual, a prominent feature of the Show. Here various dairy implements and appliances, including power and hand separators, were shown at work, and the best methods of making butter and clotted cream were practically demonstrated.

There were also Milking Competitions, the following being a comparative statement of the entries :—

| | Hereford, 1876. | Worcester, 1880. | Worcester, 1915. |
|---|---|---|---|
| **Butter-Making** .. .. .. | 0 | 0 | 197 |
| **Milking** .. .. .. .. | 0 | 0 | 18 |
| | 0 | 0 | 215 |

Musical performances were given daily by the Band of the Royal Marines (Chatham Division), under the conductorship of Mr. C. Hoby, Mus.Bac. (Oxon), A.R.C.M., L.R.A.M.

The usual Sunday Service, at which there was a large attendance of herdsmen and others engaged in the Yard, was held in the Working Dairy. The sermon was preached by the Bishop of Worcester, and the service was conducted by the Society's Chaplain (Rev. A. T. Boscawen) assisted by other clergy.

The stockmen and other employees engaged in the Yard were not forgotten, and the Worcester Branch of the Young Men's Christian Association provided a reading and writing room for them where addresses and entertainments were given in the evening.

## ATTENDANCE.

As will be seen from the following statements, the attendance at the Show was, considering the circumstances, extremely satisfactory, over 24,000 persons paying for admission on Whit-Monday, and this notwithstanding the railway companies found themselves unable to run excursion trains.

| NUMBER OF ADMISSIONS. | | | ADMISSION RECEIPTS. | | |
|---|---|---|---|---|---|
| Hereford, 1876. | Worcester, 1880. | Worcester, 1915. | Hereford, 1876. | Worcester, 1880. | Worcester. 1915. |
| 49,041 | 46,090 | 35,773 | £3,670 18 0 | £2.904 7 6 | £2,519 2 6 |

## X.—THE MILK-TEST CLASSES AT WORCESTER.

*By Dr. J. A. Voelcker, M.A., F.I.C., Consulting Chemist to the Society.*

At Worcester only nine cows competed in the Milk-Test Classes, as against seventeen at Swansea in 1914.

After weighing the animals it was found that only two—both Jerseys—came into the light-weight class (under 950lbs. live-weight), and the remaining seven—comprising one Shorthorn, two Lincoln Red Shorthorns, two South Devons, one Guernsey, and one crossbred—came into the heavy-weight class.

The cows were all milked out dry on the evening of Thursday, May 20, and the morning and evening yields of the following day (Friday, May 21), were taken for the purposes of the test.

Twelve per cent. of total solids, of which not less than 3 per cent. shall be fat, was the standard fixed for the composition of the milk.

In no case did the milk yielded fall below these figures.

The milk of one cow—No. 523—could certainly not be said to comply with the condition that the milk should be "of normal character," and it was, accordingly, left out of account.

This resulted in the award in Class 107 going to the remaining cow, Lady Wernher's Jersey, "Carlsbad." Her record being, however, but a very moderate one, a second prize only was awarded. This animal had previously competed in the Milk-Test Classes at Truro, in 1913, but was then unsuccessful. She won the Third Prize at Swansea, in 1914, besides gaining the Highly Commended award at the Shrewsbury Show of the R.A.S.E. in 1914.

In the heavy-weight class the First and Second Prizes were secured by the South Devon cows, "Milkmaid," and "Pathada Fancy 10th," both belonging to Messrs. Page & Whitley. Mr. Evens' Lincoln Red, "Burton Fox 5th," was third, giving milk both morning and evening of very satisfactory composition. Mrs. Bainbridge's Guernsey cow, "Cherry," which had been First at Truro in 1913, and second at Swansea in 1914, now secured only the Reserve number.

## MILK-TEST CLASSES.

| No. in Catalogue. | Owner and Cow. | Breed. | Age. | No. of Days in Milk. | Quantity of Milk. | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Morning. | | Evening. | | Total. | |
| | | | Years | | lbs. | oz. | lbs. | oz. | lbs. | oz. |
| | CLASS 107.<br>Cows under 950 lbs. live weight. | | | | | | | | | |
| 386 | Lady Wernher's "Carlsbad" .. .. | Jersey | 7½ | 53 | 20 | 2 | 14 | 14 | 35 | 0 |
| 523 | Mr. J. H. Smith-Barry's "Nerine" .. | ,, | 7 | 139 | 9 | 12 | 10 | 0 | 19 | 12 |
| | CLASS 108.<br>Cows 950 lbs. live weight or over. | | | | | | | | | |
| 151 | Messrs. Page & Whitley's "Milkmaid".. | S. Devon | 10 | 41 | 40 | 2 | 26 | 14 | 67 | 0 |
| 152 | Messrs. Page & Whitley's "Pathada Fancy 10th" .. .. .. .. | ,, | 6 | 28 | 37 | 4 | 23 | 12 | 61 | 0 |
| 521 | Mr. G. Gerrard's "Hentnill Daisy" .. | Shorthorn | 6 | 18 | 30 | 8 | 23 | 10 | 54 | 2 |
| 524 | Mr. G. W. Stark's "Vilot" .. .. | Cross-bred | 6½ | 157 | 10 | 4 | 10 | 8 | 20 | 12 |
| 525 | Mrs. R. C. Bainbridge's "Cherry" .. | Guernsey | 11 | 13 | 32 | 4 | 23 | 12 | 56 | 0 |
| 526 | Mr. J. Evens' "Burton Fox 5th" .. | Lincoln Red Shorthorn | 5½ | 67 | 33 | 12 | 23 | 0 | 56 | 12 |
| 527 | Mr. J. Evens' "Burton Royal Maid 4th" | ,, | 7 | 12 | 27 | 0 | 21 | 0 | 48 | 0 |

## MILK-TEST CLASSES.

| Quality of Milk. | | | | No. of Points for Milk. | No. of Points for Lactation. | Total No. of Points. | Awards. |
|---|---|---|---|---|---|---|---|
| Morning. | | Evening. | | | | | |
| Fat. | Solids. | Fat. | Solids. | | | | |
| per cent. | per cent. | per cent. | per cent. | | | | |
| 4.40 | 13.48 | 5.30 | 14.42 | 35.0 | 1.3 | 36.3 | Second Prize. |
| 12.10 | 21.82 | 10.20 | 19.71 | 19.75 | 9.9 | 28.84 | |
| 3.20 | 12.26 | 4.50 | 13.58 | 67.0 | 0.1 | 67.1 | First Prize. |
| 3.05 | 12.62 | 4.00 | 12.90 | 61.0 | nil | 61.0 | Second Prize. |
| 3.50 | 12.58 | 4.20 | 13.05 | 54.225 | nil | 54.22 | V.H.C. |
| 5.50 | 15.05 | 5.30 | 14.48 | 20.75 | 11.7 | 31.82 | |
| 4.30 | 13.23 | 4.70 | 13.55 | 56.0 | nil | 56.0 | Reserve Number. |
| 3.45 | 12.20 | 3.50 | 12.36 | 56.75 | 2.7 | 58.82 | Third Prize. |
| 4.50 | 13.80 | 4.90 | 13.68 | 48.0 | nil | 48.0 | H.C. |

## XI.—THE EXHIBITION OF CIDER AT WORCESTER.

*By H. M. Cundall, I.S.O., Steward.*

The number of entries at Worcester in 1915 was 56. Money prizes, or medals at the option of the prize winners, with certificates, were offered in each class. The classes were as follows:

172.—Cask of not less than 18 and not more than 30 gallons of Cider, made in 1914, of a specific gravity not exceeding 1.015 at 60° Fahr.

173.—12 bottles of Cider, made in 1914, of a specific gravity not exceeding 1.015 at 60° Fahr.

174.—Cask of not less than 18 and not more than 30 gallons of Cider, made in 1914.

175.—12 bottles of Cider, made in 1914.

176.—12 bottles of Cider, made in any year previous to 1914.

A sample from each exhibit was submitted to Mr. F. J. Lloyd, F.C.S., for analysis, and particulars of these analyses are given in the accompanying table. A new column has been added, showing the estimated amount of solids present in the original juice from which the cider was made.

Mr. J. Ettle, F.R.H.S., was the Judge appointed by the Society, and he made the awards on the first day of the Show.

| Class | No. | Name of Exhibitor. | Specific Gravity At 60° F. | Alcohol by Volume | Malic Acid. | Total Solids. | Original Solids. | Awards. |
|---|---|---|---|---|---|---|---|---|
| 172 | 1 | Co. Armagh Cider Co. .. | 1·020 | 4·70 | ·69 | 6·55 | 14·05 | |
| | 2 | H. J. Davis .. | 1·014 | 5·30 | ·43 | 4·98 | 13·48 | V.H.C. |
| | 3 | Pullin Bros. .. | 1·012 | 6·05 | ·54 | 4·87 | 14·57 | 2nd Prize |
| | 4 | Quantock Vale Cider Co. .. | 1·010 | 5·40 | ·61 | 4·33 | 13·03 | 1st Prize |
| | 5 | Ridler & Son .. | 1·015 | 4·55 | ·53 | 5·08 | 12·28 | 3rd Prize |
| | 6 | J. H. Skyrme | 1·020 | 3·15 | ·50 | 6·15 | 11·15 | |
| | 7 | W. T. S. Tilley | 1·014 | 5·15 | ·41 | 5·31 | 13·51 | |
| | 8 | Absent .. | .. | .. | .. | .. | .. | |
| | 9 | Yeomans Bros. | 1·032 | 3·15 | ·49 | 9·00 | 14·00 | |
| 173 | 10 | Co. Armagh Cider Co. .. | 1·017 | 3·95 | ·65 | 5·48 | 11·78 | |
| | 11 | H. J. Davis .. | 1·014 | 5·30 | ·43 | 4·95 | 13·45 | V.H.C. |
| | 12 | Pullin Bros. .. | 1·016 | 4·90 | ·37 | 5·42 | 13·22 | |
| | 13 | Ditto .. .. | 1·012 | 5·20 | ·47 | 4·60 | 12·90 | |
| | 14 | Quantock Vale Cider Co. .. | 1·011 | 5·25 | ·54 | 4·43 | 12·83 | 2nd Prize |
| | 15 | Ridler & Son .. | 1·015 | 4·55 | ·59 | 5·06 | 12·26 | 1st Prize |

| Class | No. | Name of Exhibitor. | Specific Gravity At 60° F. | Alcohol by Volume | Malic Acid. | Total Solids. | Original Solids. | Awards. |
|---|---|---|---|---|---|---|---|---|
| 173 | 16 | W. T. S. Tilley | 1·014 | 5·25 | ·36 | 5·07 | 13·47 | |
| | 17 | Ditto .. .. | 1·007 | 6·20 | ·42 | 3·67 | 13·67 | 3rd Prize |
| | 18 | Yeomans Bros. | 1·036 | 1·80 | ·49 | 9·76 | 12·66 | |
| 174 | 19 | Co. Armagh Cider Co. .. | 1·034 | 5·40 | ·67 | 10·50 | 19·20 | |
| | 20 | H. J. Davis .. | 1·025 | 3·55 | ·51 | 7·49 | 13·09 | |
| | 21 | Ditto .. .. | 1·028 | 3·10 | ·52 | 8·13 | 13·03 | 3rd Prize |
| | 22 | Ditto .. .. | 1·030 | 2·70 | ·44 | 8·50 | 12·80 | 1st Prize |
| | 23 | R. Guilding .. | 1·033 | 2·15 | ·55 | 8·91 | 12·41 | |
| | 24 | Pullin Bros. .. | 1·012 | 6·10 | ·52 | 4·84 | 14·64 | |
| | 25 | Quantock Vale Cider Co. .. | 1·031 | 3·75 | ·59 | 9·32 | 15·22 | |
| | 26 | Ridler & Son | 1·038 | 2·00 | ·64 | 10·44 | 13·64 | 2nd Prize |
| | 27 | J. H. Skyrme | 1·025 | 2·85 | ·48 | 7·15 | 11·75 | |
| | 28 | W. T. S. Tilley | 1·016 | 5·00 | ·53 | 5·44 | 13·34 | |
| | 29 | Ditto .. .. | 1·019 | 5·40 | ·48 | 6·43 | 15·13 | |
| | 30 | Yeomans Bros. | 1·033 | 3·15 | ·48 | 9·18 | 14·18 | V.H.C. |
| 175 | 31 | Co. Armagh Cider Co. .. | 1·033 | 4·80 | ·68 | 9·89 | 17·49 | |
| | 32 | H. J. Davis .. | 1·023 | 3·70 | ·52 | 6·96 | 12·76 | |
| | 33 | Ditto .. .. | 1·026 | 3·30 | ·49 | 7·54 | 12·74 | |
| | 34 | Ditto .. .. | 1·027 | 3·30 | ·49 | 7·72 | 12·92 | V.H.C. |
| | 35 | R. Guilding .. | 1·016 | 6·40 | ·83 | 5·71 | 16·01 | |
| | 36 | Ditto .. .. | 1·031 | 2·45 | ·57 | 8·65 | 12·55 | |
| | 37 | Pullin Bros. .. | 1·028 | 3·80 | ·54 | 8·28 | 14·28 | 3rd Prize |
| | 38 | Quantock Vale Cider Co. .. | 1·032 | 3·75 | ·67 | 9·41 | 15·31 | |
| | 39 | Ridler & Son | 1·041 | 1·75 | ·70 | 10·85 | 13·65 | 2nd Prize |
| | 40 | Ditto .. .. | 1·038 | 1·80 | ·63 | 10·17 | 13·07 | 1st Prize |
| | 41 | J. H. Skyrme | 1·027 | 2·60 | ·50 | 7·59 | 11·69 | |
| | 42 | W. T. S. Tilley | 1·017 | 5·40 | ·48 | 6·02 | 14·72 | |
| | 43 | Ditto .. .. | 1·022 | 4·30 | ·47 | 6·98 | 13·78 | |
| | 44 | Ditto .. .. | 1·020 | 5·40 | ·48 | 6·78 | 15·48 | |
| | 45 | Yeomans Bros. | 1·036 | 1·80 | ·55 | 9·72 | 12·62 | H.C. |
| | 46 | Ditto .. .. | 1·043 | 2·40 | ·76 | 11·62 | 15·42 | |
| 176 | 47 | Co. Armagh Cider Co. .. | 1·021 | 3·85 | ·63 | 6·21 | 12·41 | |
| | 48 | H. J. Davis .. | 1·022 | 4·50 | ·36 | 6·88 | 13·98 | 3rd Prize |
| | 49 | Ditto .. .. | 1·032 | 3·60 | ·30 | 9·38 | 15·08 | 1st Prize |
| | 50 | R. Guilding .. | 1·024 | 4·00 | ·66 | 7·21 | 13·61 | |
| | 51 | Ditto .. .. | 1·017 | 5·95 | ·54 | 6·03 | 15·53 | |
| | 52 | Ridler & Son | 1·025 | 3·95 | ·45 | 7·46 | 13·76 | |
| | 53 | J. H. Skyrme | 1·019 | 5·15 | ·49 | 6·28 | 14·48 | |
| | 54 | W. T. S. Tilley | 1·022 | 3·95 | ·36 | 6·83 | 13·13 | V.H.C. |
| | 55 | Ditto .. .. | 1·028 | 3·85 | ·34 | 8·43 | 14·63 | 2nd Prize |
| | 56 | Yeomans Bros. | 1·038 | 1·20 | ·36 | 10·06 | 11·96 | |

# XII.—ANNUAL REPORT UPON THE SOCIETY'S GENERAL OPERATIONS.

*By Thos. F. Plowman, Secretary and Editor.*

The Annual General Meeting of Members was held on Saturday, May 22, in the Council Pavilion in the Show Yard, Worcester.

The President (The Earl of Coventry), occupied the Chair, and there was a good attendance of members, including the Marquis of Bath, Sir J. Shelley, Bart., and Mr. R. Neville-Grenville, *Vice-Presidents;* Col. the Hon. C. Byng, Major Jestyn Williams, Captain C. Bathurst, M.P., Messrs. D. Alexander, W. F. Cooling, H. M. Cundall, I.S.O., F.S.A., E. G. Dulcken, J. T. Gibson, F. J. Hayes, R. J. Hoskins, T. Latham, E. Lewis, G. Lipscomb, H. B. Napier, W. Nixon, T. E. Studdy, A. F. Somerville, P. Veitch, and others.

The Minutes of the previous Annual General Meeting having been read and confirmed, the President said that His Majesty the King, who, since his accession, had been the Society's Patron, had within the last few days been graciously pleased to further honour the Society by becoming a Life Governor, and had caused to be forwarded to the Society a cheque for £20 in connection with the office. This would be very gratifying to the members, and. taken in conjunction with His Majesty having made a larger number of entries than he had done at any previous Bath and West Show, might be regarded as a further gratifying indication of the King's approval of the Society's decision to hold the Show at this juncture.

Col. the Hon. C. Byng moved, Mr. G. Lipscomb seconded, and it was resolved: "That Earl Temple and Lord Poltimore be elected Vice-Presidents of the Society."

On the motion of Mr. P. Veitch, seconded by Mr. E. G. Dulcken, the gentlemen named on page *lxxii* of the Appendix to this volume were elected members of Council for the years 1915–17.

The accompanying Report, which had been adopted at a meeting of the Council, held on the previous day, was then submitted to the meeting:—

## THE WORCESTER MEETING.

"The Council, in presenting their Annual Report, congratulate the Members upon once more visiting, after an interval of thirty-five years, the important City of Worcester.

It need hardly be said that the Council deeply regret that the Annual Meeting this year is held under such exceptional circumstances as must necessarily prevail when the nation and its Allies are waging the greatest war the world has ever had the misfortune to experience.

In view of this, the Council gave careful and anxious consideration to the question as to whether it might not be desirable to suspend the holding of the Show for the current year.

The matter was referred to a Committee charged with investigating all the surrounding circumstances, who, having done so, reported that they had come to the conclusion that, notwithstanding the unusual conditions prevailing owing to the War, it was desirable that the Show should take place as originally arranged, and the Council concurred in this. As early as possible in the year a circular letter was sent to every Member announcing this decision and specifying the grounds upon which it was arrived at.

The many calls upon the public purse to meet emergencies arising out of the War, rendered it difficult for the Worcester Local Committee to fully comply with the financial undertaking they had entered into with the Society. The Council therefore agreed to accept from them half the sum stipulated; the Local Committee, on their part, acquiescing in some curtailment of the dimensions of the Show. This concession coupled with the fact that, owing to national demands, the cost both of labour and material is abnormally high, has rendered it necessary to temporarily forego some of the usual departments of the Show representative of poultry, nature study, forestry and shoeing. The entries in other departments are very satisfactory, the number of exhibits showing a remarkable advance in comparison with that of the Society's last Show at Worcester in 1880. Many more breeds of stock are now represented than were to be found at the earlier Show, whilst agricultural produce which then had no place in the Show Yard, is now an important feature there. Bearing in mind existing conditions, the Society is to be congratulated upon there having been so good a response in support of the Show from all classes of exhibitors, whether of stock or implements, from his Majesty downwards.

In this connection, the Council desire to express their indebtedness to the Herefordshire and Worcestershire Agricultural Society for the way in which they have co-operated in promoting the Show and for amalgamating their own Show with it.

## GENERAL OPERATIONS.

The Council have not limited their attention to the Annual Show, but, when opportunity has offered, have lent their support to various objects for the advancement of agriculture and kindred industries. Foremost among these is the National Fruit and Cider Institute, to which the Society makes an annual grant of £100, and, in return for this, the resources of the Institute are thrown open to members of the Society free of charge.

The Board of Agriculture and Fisheries having called attention to the Merchandise Marks Act, 1887 to 1894, dealing with false trade descriptions relative to agricultural and horticultural produce, the Council resolved to co-operate with the Board in the administration of the Act by bringing under their notice cases which there was reason to suppose contravened it.

In view of the important bearing of the Milk and Dairies Act (1914) upon the dairying industry and the drastic nature of its provisions, the Council have felt it desirable that associations representative of the industry should be taken into consultation before its clauses were enforced, believing that this would tend to promote the smooth working of the Act and the interests of all concerned. They have, therefore, asked the Local Government Board to submit to the Society any orders under the Act before issuing them.

In response to an invitation of the Board of Agriculture and Fisheries, the Council have appointed Mr. W. H. Clark and the Secretary as representatives of the Society at a Conference called by the Board for the purpose of considering the present shortage of agricultural labour and means of meeting the difficulty.

Sir C. T. D. Acland's term of office, as a Governor of the National Fruit and Cider Institute, having expired, the Council have had much pleasure in re-nominating him.

## THE WAR.

Most institutions have been affected, either directly or indirectly, by the War, and, as has been already pointed out, the Bath and West Society has been no exception to the rule. Apart from its influence upon the Annual Show, the Society's ranks have been temporarily impoverished by the response of its Members to the nation's call, and several Members of Council and Stewards are now actively serving their King and Country.

This has placed the Council in a position of some difficulty with respect to the office of President for the ensuing year. It has hitherto been customary for the Council, at the Annual General Meeting of Members, to make a recommendation of some one of position and influence in the County in which the Show is held, to occupy the presidential chair. The War has, however, called away from the County, namely, Wiltshire, in which it is proposed to hold the 1916 Show, several whom the Council would desire to consult, or who might be eligible for the office. Under these circumstances, the Council do not make any recommendation at the present moment, but, in order to obviate calling together the whole of the Members for the sole purpose of approving, or otherwise, a future recommendation, the Council ask that power may be given them to nominate and appoint a President as soon as circumstances permit of this. The Council have much pleasure in reporting that the Earl of Coventry has most kindly consented to continue in office, pending the appointment of his successor.

The Council, having been invited to appoint representatives on a Committee formed by the Royal Agricultural Society of England to assist in the restoration of Agriculture in the districts of the countries of our Allies devastated by the War, have appointed Messrs. W. Ashcroft, W. H. Clark, H. M. G. Evans, G. E. Lloyd-Baker and A. O. Sillifant in this capacity. An appeal is made for donations of money and promises of contributions in kind, such as live stock, seed-corn, etc.; the latter contributions to be handed over when the occasion is opportune for them to be distributed; and the Council heartily commend the appeal to the support of the Members.

### Council Losses and Gains.

The Council regret that during the past year death has deprived the Society of several old and valued supporters, the following members of Council having passed away:—The Earl of Clarendon, a Vice-President, who, in 1896, filled the office of President with much distinction; Colonel T. W. Chester-Master, a staunch upholder of the Society's best traditions, who, on many occasions, rendered essential service as a Deputy Steward of Stock; Sir H. Miles, Bart., a Steward of Finance, whose sterling qualities and good-comradeship endeared him to all his colleagues; Colonel H. M. Skrine, an ever-ready helper in all that promoted the Society's best interests and the very embodiment of kindly courtesy; and Mr. Cary Coles, a recent addition to the Council, whose agricultural knowledge and practical experience justified a confident belief that he would be a distinct acquisition to it.

The Council recommend that Earl Temple and Lord Poltimore be elected Vice-Presidents of the Society, and that the gentlemen named on the Agenda Paper be elected Members of Council for the years 1915–17. They include those retiring by rotation, but who are willing to serve again, with the addition of the Hon. T. H. Watson, Sir M. R. Burrell, Bart., and Colonel H. Lewis to fill vacancies. An extraordinary vacancy in the Council has been filled by the election of Mr. R. A. Fox.

### RECOGNITION OF LOCAL BODIES.

The Council invited the Mayor of Worcester to attend Council Meetings, as an ex-officio member during the twelve months ending with the termination of the present Show, and also invited the Local Committee and the Herefordshire and Worcestershire Agricultural Society, in alliance for the year with the Bath and West Society, to nominate two representatives each to attend in a similar capacity.

The Council, in the belief that such a recognition of local bodies facilitates friendly co-operation between them and the Society, propose to adopt a similar course in the future.

### 1916 MEETING.

The Council have much pleasure in reporting that they have accepted a cordial invitation from Salisbury for the Society to hold its 1916 Meeting in that County.

The adoption of the Report was moved by the President, seconded by Mr. R. Neville-Grenville, and agreed to.

The Marquis of Bath moved, Mr. D. Alexander seconded, and it was unanimously resolved :—" That the thanks of the Society be presented to the Mayor of Worcester and to the Worcester Local Committee for their efforts to promote the success of the meeting ; and to the Herefordshire and Worcestershire Agricultural Society for their cordial co-operation."

Captain C. Bathurst, M.P., moved, Mr. E. Lewis seconded, and it was resolved : " That the thanks of the Society be presented to those gentlemen who have kindly acted as Judges in the several Departments."

Sir J. Shelley, in moving a vote of thanks to the President, referred to the very active interest he had taken in the work of the Society during the past year, whilst he had presided over their meetings with the greatest ability and geniality.

Mr. T. Latham seconded, and the Earl of Coventry having briefly returned thanks, the proceedings terminated.

## XIII.—THE NATIONAL FRUIT AND CIDER INSTITUTE.

*Professor B. T. P. Barker, M.A., Director.*

It was the practice in the earlier annual reports on the work of this institution to give, as far as possible in a summarised form, an account of the results of the various investigations in hand during the year under review. The extension of the work during the last few years has rendered a complete account impossible within the limits of the space available; and, consequently, only certain selected subjects have been dealt with in the more recent reports. This course has been adopted again this year, the subjects referred to being selected as representative of the various directions of work now being undertaken. The accounts of the respective investigations included in this report have been prepared in each instance by the member of the staff responsible for the work

The investigations on Cider-making described include those on Single Variety Ciders and Perries, 1914–15, Acetic Bacteria of Cider, Pasteurization of Bottled Cider, Experiments to stop Fermentation of Cider, Ozonair against Cider Sickness, and Plum Wine, these sections being contributed by Mr. O. Grove.

Under the head of Fruit Culture, Mr. G. T. Spinks, B.A., has dealt with the work on Apple Root Stock Investigations, and Professor Barker with Strawberry Stock Experiments.

In the direction of Plant Diseases and their Treatment, Professor Barker and Mr. A. H. Lees, M.A., have contributed the section on Summer Spraying Treatment of American Gooseberry Mildew, and Mr. Lees is also responsible for the sections on Treatment of Big Bud, Winter Treatment of Mussel Scale, Frit Fly Experiments, and Winter Cover Washes.

The miscellaneous investigations described refer to Waste from Saw Mills as a Source of Potash, the Composition of Mangels grown in the Provincial Council (Bristol Province) Mangel Variety Trials, 1915, both by Mr. C. T. Gimingham, F.I.C., and Apple Pectins and Their Uses, by Professor Barker.

### SINGLE VARIETY CIDERS AND PERRIES, 1914–15.

During the season 1914–15 a large number of single variety ciders and perries were made, the details of which will be found in the following table. The apple crop of 1914 was a very abundant one, and upon the whole it can be said that the fruits were well developed and ripened. Consequently the ciders were mostly of a good quality. The specific gravities of the juices averaged 1·0532, which is about normal, and the percentages of acid and tannin were in many cases

## SINGLE VARIETY CIDERS AND PERRIES.

In each case the pomace was pressed immediately after milling, and allowed to ferment naturally in cask, without keeving (unless otherwise stated), until the specific gravity had dropped to 1·025—1·035 in the average case, when the liquor was filtered.

| No. | Name of Variety. | District where Grown | Date of Making. | Specific Gravity of Fresh Juice. | Malic Acid per cent. | Tannin per cent. | Rate of Fermentation at 28° C. | Special Treatment. | Specific Gravity May 6th, 1915. |
|---|---|---|---|---|---|---|---|---|---|
| | APPLES.—SHARP VARIETIES. | | | | | | | | |
| 1 | Brice's Kernel | Lydney | Oct. 29th | 1·043 | ·85 | ·14 | 9·5 | .... | 1·003 |
| 2 | Galliardiott | Brockley | Nov. 10th | 1·045 | ·83 | ·14 | 4·0 | .... | 1·013 |
| 3 | Rouge de Trèves | ,, | Dec. 21st | 1·045 | ·77 | ·15 | 5·5 | .... | 1·015 |
| 4 | Yellow Styre | Lydney | Nov 2nd | 1·060 | ·62 | ·25 | 5·5 | .... | 1·021 |
| 5a | Dufflin | Truro | Oct. 19th | 1·060 | ·80 | ·18 | 3·1 | .... | 1·023 |
| 5b | ,, | ,, | ,, | 1·060 | ·80 | ·18 | 3·1 | Fermented with yeast 37 (Riesling) | 1·023 |
| 6 | Page's Yellow | Lydney | Oct. 27th | 1·049 | ·64 | ·12 | 6·0 | .... | 1·023 |
| 7 | Pople's Gutter | Backwell | Dec. 4th | 1·050 | ·83 | ·27 | 5·1 | .... | 1·026 |
| 8 | Red Streak | Ledbury | Oct. 27th | 1·051 | ·75 | ·17 | 4·1 | .... | 1·025 |
| 9 | Teign Harvey | Newton Abbot | ,, | 1·046 | ·58 | ·31 | 3·2 | .... | 1·024 |
| 10 | Cap of Liberty | Long Ashton | Nov. 4th | 1·048 | ·63 | ·24 | 6·2 | .... | 1·021 |
| 11 | ,, | Brockley | Nov. 26th | 1·055 | ·76 | ·26 | 5·0 | .... | 1·022 |
| 12a | ,, | Martock | Nov. 10th | 1·046 | ·75 | ·20 | 2·1 | .... | 1·031 |
| 12b | ,, | ,, | ,, | 1·046 | ·75 | ·20 | 2·1 | Fermented with yeast 37 (Riesling) | 1·033 |
| 12c | ,, | ,, | ,, | 1·046 | ·75 | ·20 | 2·1 | Fermented with yeast 34 (Laureiro) | 1·031 |
| 13 | ,, | South Petherton | Nov. 10th | 1·046 | ·85 | ·21 | 2·6 | .... | 1·033 |
| 14a | Lambrook Pippin | ,, | Nov. 27th | 1·046 | ·59 | ·18 | 2·2 | Fruit ground medium | 1·024 |
| 14b | ,, | ,, | ,, | 1·046 | ·59 | ·18 | 2·2 | Fruit ground coarse | 1·024 |
| 14c | ,, | ,, | ,, | 1·046 | ·59 | ·18 | 2·2 | Fruit ground very fine | 1·024 |
| 15 | ,, | ,, | Dec. 21st | 1·047 | ·45 | ·22 | 3·8 | .... | 1·026 |
| 16 | ,, | ,, | Jan. 14th | 1·044 | ·50 | ·18 | 4·2 | .... | 1·024 |
| 17 | Bickington Grey | Newton Abbot | Nov. 17th | 1·053 | ·95 | ·13 | 6·8 | .... | 1·024 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 18 | Cherry Pearmain | Weobley | Nov. 3rd | 1·056 | ·57 | ·24 | 4·0 | .... | 1·027 |
| 19*a* | College | Nunnington | Nov. 4th | 1·050 | ·75 | ·20 | 3·3 | .... | 1·025 |
| 19*b* | ” | ” | ” | 1·050 | ·75 | ·20 | 3·3 | Fermented with yeast 31 (Rüdesheimer) | 1·028 |
| 20 | Porter's Perfection | South Petherton | Dec. 21st | 1·050 | ·60 | ·25 | 2·7 | .... | 1·028 |
| 21 | Backwell Red | Backwell | Oct. 26th | 1·046 | ·62 | ·09 | 3·5 | .... | 1·028 |
| 22 | Butter Box | Newton Abbot | Nov. 4th | 1·047 | ·64 | ·21 | 4·6 | .... | 1·028 |
| 23 | Old Foxwhelp | Nunnington | ” | 1·061 | ·95 | ·41 | 1·8 | .... | 1·038 |
| 24*a* | Kingston Black | Tintinhull | Nov. 16th | 1·053 | ·47 | ·17 | 4·2 | .... | 1·022 |
| 24*b* | ” | ” | ” | 1·053 | ·47 | ·17 | 4·2 | Fermented with yeast 28 (Kingston Black) | 1·020 |
| 24*c* | ” | ” | ” | 1·053 | ·47 | ·17 | 4·2 | Fermented with yeast 37 (Riesling) | 1·024 |
| 25 | ” | Brockley | Nov. 26th | 1·061 | ·45 | ·19 | 5·5 | .... | 1·022 |
| 26 | ” | Staplegrove | Nov. 3rd | 1·053 | ·44 | ·17 | 4·7 | .... | 1·026 |
| 27 | ” | White Lackington | Nov. 9th | 1·051 | ·43 | ·15 | 5·0 | .... | 1·028 |
| 28 | ” | Norton Fitzwarren | Nov. 16th | 1·055 | ·41 | ·15 | 4·3 | .... | 1·028 |
| 29 | ” | Oldbury | Nov. 16th | 1·050 | ·45 | ·15 | 5·1 | .... | 1·027 |
| 30*a* | ” | Hereford | Nov. 2nd | 1·055 | ·55 | ·24 | 4·4 | .... | 1·029 |
| 30*b* | ” | ” | ” | 1·055 | ·55 | ·24 | 4·4 | Fermented with yeast 30 (Forst) | 1·033 |
| 31*a* | ” | Martock | Nov. 3rd | 1·052 | ·47 | ·19 | 2·9 | .... | 1·032 |
| 31*b* | ” | ” | ” | 1·052 | ·47 | ·19 | 2·9 | Fermented with yeast 37 (Riesling) | 1·029 |
| 32 | ” | Tibberton | Nov. 26th | 1·060 | ·50 | ·16 | 4·5 | .... | 1·029 |
| | SWEET VARIETIES. | | | | | | | | |
| 33 | Court Royal | Long Ashton | Oct. 19th | 1·045 | ·23 | ·10 | 11·2 | .... | 1·000 |
| 34 | Burstout | South Petherton | Nov. 9th | 1·051 | ·16 | ·10 | 5·5 | .... | 1·013 |
| 35 | Cremière | Backwell | Dec. 4th | 1·055 | ·21 | ·17 | 8·3 | .... | 1·015 |
| 36 | Dove | North Cadbury | Nov. 16th | 1·048 | ·20 | ·18 | 6·0 | .... | 1·017 |
| 37 | Rouge Bruyère | Brockley | Nov. 10th | 1·051 | ·24 | ·19 | 9·4 | .... | 1·015 |
| 38 | Fréquin de Chartres | ” | ” | 1·049 | ·34 | ·17 | 7·8 | .... | 1·020 |
| 39*a* | Sweet Alford | Alphington | Oct. 26th | 1·050 | ·17 | ·20 | 5·2 | .... | 1·023 |
| 39*b* | ” | ” | ” | 1·050 | ·17 | ·20 | 5·2 | Fermented with yeast 32 (Steinberg) | 1·022 |
| 39*c* | ” | ” | ” | 1·050 | ·17 | ·20 | 5·2 | Fermented with yeast 33 (Piesport) | 1·021 |

## SINGLE VARIETY CIDERS AND PERRIES—*continued.*

| No. | Name of Variety. | District where Grown. | Date of Making. | Specific Gravity of Fresh Juice. | Malic Acid per cent. | Tannin per cent. | Rate of Fermentation at 28° C. | Special Treatment. | Specific Gravity May 6th, 1915. |
|---|---|---|---|---|---|---|---|---|---|
| 39d | Sweet Alford | Alphington | Oct. 26th | 1·050 | ·17 | ·20 | 5·2 | Fermented with yeast 35 (Rum yeast) | 1·022 |
| 39c | ,, | ,, | ,, | 1·050 | ·17 | ·20 | 5·2 | Fermented with pressed yeast | 1·020 |
| 40 | Slack ma Girdle | ,, | Nov. 4th | 1·050 | ·22 | ·16 | 4·2 | .... | 1·021 |
| 41a | ,, | Newton Abbot | Nov. 17th | 1·047 | ·29 | ·15 | 4·3 | .... | 1·020 |
| 41b | ,, | ,, | ,, | 1·047 | ·29 | ·15 | 4·3 | Fermented with yeast 20 (Lambrook Pippin) | 1·022 |
| 42a | Spotted White | Alphington | Nov. 2nd | 1·058 | ·21 | ·16 | 6·3 | .... | 1·024 |
| 42b | ,, | ,, | ,, | 1·058 | ·21 | ·16 | 6·3 | Fermented with yeast 38 (India) | 1·024 |
| 42c | ,, | ,, | ,, | 1·058 | ·21 | ·16 | 6·3 | .... | 1·014 |
| 43 | Froginton Glory | North Cadbury | Nov. 16th | 1·054 | ·25 | ·19 | 5·0 | .... | 1·022 |
| 44 | Noir de Vitry | Brockley | Nov. 26th | 1·047 | ·26 | ·17 | 7·3 | .... | 1·016 |
| 45 | Rouge Latour | ,, | Dec. 21st | 1·065 | ·38 | ·19 | 6·1 | .... | 1·023 |
|  | BITTERSWEET VARIETIES. |  |  |  |  |  |  |  |  |
| 46 | Dabinett | Long Ashton | Dec. 4th | 1·055 | ·15 | ·28 | 7·8 | .... | 1·013 |
| 47 | Tardive Forestier | Brockley | Nov. 26th | 1·048 | ·27 | ·38 | 6·3 | .... | 1·016 |
| 48 | Medaille d'Or | Long Ashton | Nov. 3rd | 1·051 | ·24 | ·47 | 8·7 | .... | 1·017 |
| 49 | Frequin Audièvre | Truro | Dec. 4th | 1·058 | ·22 | ·29 | 7·2 | .... | 1·018 |
| 50 | George James | North Cadbury | Dec. 3rd | 1·045 | ·18 | ·21 | 5·6 | .... | 1·017 |
| 51 | Strawberry Norman | Long Ashton | Nov. 4th | 1·050 | ·40 | ·42 | 5·2 | .... | 1·018 |
| 52 | Muscadet | Brockley | Nov. 10th | 1·057 | ·30 | ·23 | 8·6 | .... | 1·018 |
| 53a | Fillbarrel | North Cadbury | Dec. 3rd | 1·058 | ·20 | ·34 | 5·3 | .... | 1·017 |
| 53b | ,, | ,, | ,, | 1·058 | ·20 | ·34 | 5·3 | Fermented with yeast 37 (Riesling) | 1·021 |
| 53c | Fillbarrel | North Cadbury | Dec. 3rd | 1·058 | ·20 | ·34 | 5·3 | .... | 1·010 |
| 54 | Harry Masters | ,, | Dec. 4th | 1·059 | ·22 | ·27 | 7·0 | .... | 1·019 |
| 55a | Eggleton Styre | Ledbury | Nov. 2nd | 1·069 | ·36 | ·23 | 5·4 | .... | 1·022 |
| 55b | ,, | ,, | ,, | 1·069 | ·36 | ·23 | 5·4 | Fermented with yeast 29 (Rhenish wine) | 1·027 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 56*a* | Dabinett | South Petherton | Nov. 17th | 1·056 | ·21 | ·23 | 4·3 | .... | 1·022 |
| 56*b* | ,, | ,, | ,, | 1·056 | ·21 | ·23 | 4·3 | Fermented with yeast 27 (Johannisberg) | 1·024 |
| 57 | Medaille d'Or | Truro | ,, | 1·051 | ·21 | ·43 | 4·1 | .... | 1·020 |
| 58 | Royal Jersey | North Cadbury | Dec. 3rd | 1·060 | ·17 | ·35 | 6·7 | .... | 1·022 |
| 59*a* | Broadleaved French | Ross | Nov. 9th | 1·053 | ·22 | ·27 | 6·3 | .... | 1·020 |
| 59*b* | ,, | ,, | ,, | 1·053 | ·22 | ·27 | 6·3 | .... | 1·011 |
| 59*c* | ,, | ,, | ,, | 1·053 | ·22 | ·27 | 6·3 | Cleared with gelatine | 1·015 |
| 59*d* | ,, | ,, | ,, | 1·053 | ·22 | ·27 | 6·3 | .... | 1·004 |
| 60 | White Norman | Weobley | Oct. 27th | 1·047 | ·19 | ·35 | 4·5 | .... | 1·016 |
| 61 | Strawberry Norman | ,, | Nov. 2nd | 1·057 | ·34 | ·45 | 4·3 | .... | 1·023 |
| 62 | Brown Snout | Nunnington | Nov. 3rd | 1·052 | ·27 | ·30 | 5·0 | .... | 1·020 |
| 63 | Yarlington Mill | North Cadbury | Nov. 16th | 1·043 | ·19 | ·21 | 5·0 | .... | 1·019 |
| 64*a* | Chisel Jersey | South Petherton | Nov. 26th | 1·058 | ·23 | ·35 | 5·5 | .... | 1·024 |
| 64*b* | ,, | ,, | ,, | 1·058 | ·23 | ·35 | 5·5 | .... | 1·025 |
| 65 | ,, | North Cadbury | Dec. 3rd | 1·058 | ·19 | ·37 | 6·0 | .... | 1·024 |
| 66 | Twistbody Jersey | ,, | ,, | 1·056 | ·18 | ·24 | 6·0 | .... | 1·032 |
| 67*a* | ,, | Martock | Nov. 10th | 1·059 | ·20 | ·43 | 5·8 | .... | 1·029 |
| 67*b* | ,, | ,, | ,, | 1·059 | ·20 | ·43 | 5·8 | Fermented with pressed yeast | 1·027 |
| 68 | Knotted Kernel | Weobley | Oct. 27th | 1·055 | ·22 | ·49 | 4·5 | .... | 1·028 |
| 69*a* | Newton Jersey | Newton St. Cyres | Nov. 2nd | 1·047 | ·27 | ·28 | 3·3 | .... | 1·028 |
| 69*b* | ,, | ,, | ,, | 1·047 | ·27 | ·28 | 3·3 | .... | 1·027 |
| 70*a* | Royal Jersey | Martock | Nov. 10th | 1·048 | ·27 | ·27 | 5·0 | .... | 1·021 |
| 70*b* | ,, | ,, | ,, | 1·048 | ·27 | ·27 | 5·0 | Fermented with pressed yeast | 1·021 |
| 71*a* | Horner | South Petherton | Oct. 27th | 1·056 | ·14 | ·32 | 4·2 | .... | 1·027 |
| 71*b* | ,, | ,, | ,, | 1·056 | ·14 | ·32 | 4·2 | Fermented with pressed yeast | 1·020 |
| 72 | Buskin | North Cadbury | Nov. 16th | 1·057 | ·28 | ·21 | 6·1 | .... | 1·026 |
| 73 | White Jersey | ,, | ,, | 1·055 | ·27 | ·27 | 3·7 | .... | 1·028 |
| | PEARS. | | | | | | | | |
| 74 | Red Pear | Ledbury | Oct. 26th | 1·051 | ·28 | ·16 | 5·1 | .... | 1·021 |
| 75 | Butt Pear | ,, | Oct. 27th | 1·061 | ·74 | ·26 | 3·2 | .... | 1·027 |
| 76 | Oldfield | Tibberton | Nov. 23rd | 1·054 | ·61 | ·09 | 3·1 | .... | 1·027 |
| 77 | ,, | Hardwicke | Nov. 16th | 1·048 | ·93 | ·05 | 3·1 | .... | 1·029 |
| 78 | ,, | Marden | ,, | 1·057 | ·59 | ·12 | 4·7 | .... | 1·030 |
| 79 | ,, | Ledbury | Nov. 4th | 1·057 | ·53 | ·47 | 1·6 | .... | 1·029 |

above the normal, which gave the ciders a well-marked flavour and aroma. Indeed, in several instances, the tannin character was unduly pronounced. While the percentage of acid showed a tendency to be above the normal, particularly for the sweet and bitter-sweet varieties, in the case of the sharpest varieties it was somewhat lower than usual. As usual some of the best ciders of the season were made from the Kingston Black juices, the one marked 28 in the table being generally considered the best: but none could be considered quite typical or up to the standard of the variety. Several of the Cap of Liberty ciders were remarkably good, this being especially the case with No. 13. Some new French varieties, grown in Somerset, were tried, and some of them gave promise of being of value; but the quantities of fruit available were not quite large enough to make the test a completely satisfactory one.

Generally speaking, the 1914–15 vintage may be regarded as well up to the average, occasional ciders being exceptionally good. It was not, however, quite so good for varieties which normally do not require blending, the tannin character being too marked and a lack of fruitiness noticeable.

## THE ACETIC BACTERIA OF CIDER.

For some time a number of acid-forming bacteria have been isolated from samples of acetified ciders and examined in pure cultures. The object has been to find out how many different varieties of acetic bacteria occur in ciders, and what are their principal characters and properties. The important rôle these bacteria play in connection with cider and perry has already been pointed out in preceding reports, and the different ways of preventing acetification have been mentioned.

Between thirty and forty acetified ciders have been examined and from these five different types of bacteria have been isolated. Of these four were quite distinct species, the fifth, perhaps, being only a variation of one of the other types. The most common of the species found was the one described as No. 1, the well-known Bacterium xylinum. The four other types were less frequently found; in some cases one or more of them were present together with Bacterium xylinum.

The following are the principal characters of the five types of bacteria, as shown by cultures in a malt-extract solution of a specific gravity of 1·040 to which was added, after sterilisation, 2 per cent. of alcohol.

*No.* 1. Bacterium xylinum. After three days at 25°C., a thick, leathery, yellowish, transparent film is formed on the surface of the liquid. This film is very characteristic, and so strong that it can be lifted out of the culture-flask in one piece. The liquid remains clear and no deposit is formed. After keeping the culture-flasks for some time the film gradually sinks in the liquid, and a new one is formed upon the surface. This process goes on, until the whole flask is filled with layers of film. On malt-extract-gelatine small, raised, sticky colonies of a yellowish-transparent colour are slowly formed. The bacterium is a small rod without motility or spore-formation, the most common size being ·6—·8 μ by 1·5—2 μ. Involution forms are common, those formed in gelatine-colonies often of a curious curled-up shape.

*No.* 2. After three days at 25°C. a white film with dry and wrinkled surface is formed on top of the liquid. The film is easily broken. The liquid remains clear, and a thin white deposit is formed in the flasks. On malt-extract-gelatine colonies are slowly formed, they are small, greyish-white, with a glistening surface. The bacteria have no motility and spore formation does not take place. It is rod-shaped, single or in chains, and very irregular in size, its most common dimensions being ·4—·6 μ by 1—3 μ. Large involution forms are common. It gives no coloration with iodine.

*No.* 3. After three days at 25°C. a white film with smooth surface is formed on the surface of the liquid. The film shows a tendency to creep up the sides of the culture-flask to a high degree, ascending in some cases to one inch above the liquid, which remains clear with a thin white deposit. On malt-extract-gelatine small, whitish colonies with transparent edges are slowly formed. The bacteria do not show motility or spore-formation, and are found single and in chains. The commonest dimensions are ·6—·8 μ by 1·5—2 μ, but there are also many larger rods. Involution forms are very common. No coloration with iodine occurs.

*No.* 4. After three days at 25°C. a thin, white, ascending film with smooth surface is formed, and the liquid remains clear with a fine deposit. After some time the film sinks to the bottom of the culture-flasks, and no new film is formed. Colonies on malt-extract-gelatine are similar to No. 3, but without transparent edges. This bacterium is not motile, and no spore-formation has been observed. It is a very short rod, single, and in long chains, its dimensions being about 1 by 1·5 μ. Involution forms are found but rarely. No coloration with iodine occurs.

*No.* 5. This does not form a continuous film after three days at 25°C.; only patches of a faint yellowish colour are floating upon the surface. The liquid is slightly cloudy, with a white, floculent deposit. Very slow growth occurs on malt-extract-gelatine, where small colonies of a greyish-white colour with a dull surface are formed; the colonies have a bluish tinge in transparent light. No motility nor spore-formation have been observed. The bacterium is a thin rod, mostly in chains, its dimensions being about ·5 by 1—1·5 μ. Involution forms are very rare. No coloration is given with iodine.

These bacteria were tested in relation to their power of forming acetic acid from alcohol. Culture-flasks containing sterilised malt-extract, to which was added 3 per cent. of alcohol, were inoculated with the different bacteria in pure cultures and examined at intervals for increase of acetic acid. The flasks were kept at 25°C.

| Bacterium | Percentage of Acetic Acid after | | | | | Per Cent alcohol left |
|---|---|---|---|---|---|---|
| | 1 month | 2 months | 3 months | 5 months | 6 months | |
| No. 1 .. | ·624 | 1·22 | 2·09 | 2·05 | 1·87 | |
| No. 2 .. | ·522 | ·94 | 1·44 | 2·37 | 2·32 | ·19 |
| No. 3 .. | ·522 | 1·014 | 1·62 | 2·46 | 2·65 | ·26 |
| No. 4 .. | ·630 | ·954 | 1·54 | 2·16 | 1·93 | ·21 |
| No. 5 .. | ·384 | ·690 | 1·08 | 2·02 | 2·21 | ·16 |

*Determination of Acid Formation in Cider.*—The cider used was a blend of different kinds, and contained, after sterilization, ·46 per cent. of malic acid, 2·04 per cent. of alcohol (by weight), and had a specific gravity of 1·019. The flasks, each containing half a litre, were inoculated with the bacteria. and kept at 25°C.

| Bacterium | Percentage of Acetic Acid after | | | | | Per Cent. Alcohol left |
|---|---|---|---|---|---|---|
| | 1 month | 2 months | 4 months | 5 months | 6 months | |
| No. 1 .. | ·624 | ·828 | 1·28 | 1·45 | 1·79 | ·05 |
| No. 2 .. | ·816 | 1·53 | 1·68 | 1·75 | 1·86 | ·11 |
| No. 3 .. | 1·476 | 1·584 | 1·92 | 1·98 | 2·046 | ·05 |
| No. 4 .. | 2·364 | 2·406 | 2·37 | 2·32 | 2·46 | ·10 |
| No. 5 .. | 1·554 | 1·590 | 1·69 | 1·74 | 1·782 | ·05 |

A series of similar cultures in the same cider were kept in a cellar with an average temperature of about 15°C.

| Bacterium | Percentage of Acetic Acid after | | | | |
|---|---|---|---|---|---|
| | 1 month | 3 months | 4 months | 5 months | 6 months |
| No. 1 .. | ·552 | ·606 | ·624 | ·660 | ·726 |
| No. 2 .. | ·306 | ·618 | ·648 | ·762 | ·798 |
| No. 3 .. | ·048 | ·594 | ·714 | ·822 | ·876 |
| No. 4 .. | ·042 | ·096 | ·114 | ·174 | ·174 |
| No. 5 .. | ·036 | ·108 | ·162 | ·198 | ·240 |

As will immediately be seen from the above tables, the temperature has a great influence upon the growth of the acetic acid bacteria, and the speed with which the alcohol is transformed into acetic acid. This is more pronounced in the case of some of the bacteria than with others. In the experiments with cider the bacterium No. 4, gives 2·364 per cent. of acetic acid after one month at 25°C., whereas the acid formed at cellar-temperature in the same time is only ·042 per cent., or 1-56th part of the amount produced at 25°C. Similar, although not so large, differences can be noted in the cases of the bacteria Nos. 3 and 5; but as regards Nos. 1 and 2 the influence of temperature upon the acid-forming properties is much less pronounced.

As regards the rapidity with which the oxidation of the alcohol into acetic acid takes place, it will be seen from the experiments with cider at 25°C. that there are very noticeable differences between the different types of bacteria. After one month No. 1 has formed ·624 per cent. of acid, whereas No. 4 has formed 2·364 per cent. in the same time and has, as a matter of fact, reached its maximum then; this is not the case with No. 1, which needs six months to attain its maximum production. At cellar-temperature the rôles are changed about, No. 1 producing ·552 per cent. of acid in one month and No. 4 only ·042 per cent., or less than 1-10th in the same time.

To try the influence of the acetic bacteria upon the different sugars, solutions containing 3 per cent. of cane-sugar, dextrose and lævulose, to which were added peptone and nutrient salts, were prepared, sterilized, and inoculated with the different bacteria. The flasks were left for three weeks at 25°C., and examined for acetic acid:—

| Bacterium | Percentage of Acetic Acid in | | |
|---|---|---|---|
| | Saccharose | Dextrose | Lævulose |
| No. 1 .. | 0 | ·24 | ·024 |
| No. 2 .. | 0 | ·35 | ·018 |
| No. 3 .. | 0 | ·50 | ·006 |
| No. 4 .. | 0 | 0 | 0 |
| No. 5 .. | 0 | ·174 | ·012 |

As will be seen, acetic acid was formed in most cases from lævulose, and in larger proportions from dextrose, but all the experiments with cane-sugar were negative.

Some experiments were carried out to investigate the influence of different organic acids upon the development of the acetic bacteria. The acids used were malic, tartaric, citric and lactic acid. The acids were added in different proportions to cider, the mixtures were sterilized, inoculated with the bacteria Nos. 1 and 4 and placed at room-temperature :—

| Content of Acid per cent. | Percentage of Acetic Acid present after 2 months. | | Percentage of Acetic Acid present after 3 months. | |
|---|---|---|---|---|
| | Bacter. No. 1 | Bacter. No. 4 | Bacter. No. 1 | Bacter. No. 4 |
| No. 1 .. ·32 Malic acid .. | 1·80 | ·63 | 1·86 | 1·09 |
| No. 2 .. ·45 „ „ .. | 1·54 | ·93 | 1·93 | 1·10 |
| No. 3 .. ·67 „ „ .. | 1·40 | ·92 | 1·81 | 1·12 |
| No. 4 .. ·84 „ „ .. | 2·09 | ·85 | 2·15 | 1·0 |
| No. 5 .. 1·03 „ „ .. | ·054 | ·19 | 1·25 | ·24 |
| No. 6 .. ·49 Tartaric acid | 1·94 | ·51 | 2·08 | ·67 |
| No. 7 .. ·66 „ „ .. | 2·10 | ·22 | 2·28 | ·31 |
| No. 8 .. ·85 „ „ .. | 2·22 | ·08 | 2·33 | ·20 |
| No. 9 .. 1·01 „ „ .. | ·24 | ·10 | ·26 | ·12 |
| No. 10 .. ·44 Citric acid .. | 1·08 | 1·09 | 1·2 | 1·21 |
| No. 11 .. ·63 „ „ .. | 1·78 | ·94 | 1·94 | 1·11 |
| No. 12 .. ·78 „ „ .. | 2·44 | 2·42 | 2·59 | 2·62 |
| No. 13 .. 1·00 „ „ .. | 1·46 | 1·89 | 1·72 | 1·99 |
| No. 14 .. ·50 Lactic acid .. | ·03 | ·21 | ·29 | |
| No. 15 .. ·72 „ „ .. | ·04 | ·21 | ·28 | |
| No. 16 .. ·93 „ „ .. | ·042 | ·39 | ·49 | |
| No. 17 .. 1·06 „ „ .. | ·048 | ·39 | ·45 | |

The cider used was the same for all the experiments, and contained originally ·32 per cent. of malic acid; consequently ·32 has to be subtracted to find the quantity of acid added in all the figures relating to tartaric, citric, and lactic acid in the table.

It will be seen from the figures that only relatively large quantities of acid have any inhibitory action upon the development of the bacteria in the cases of malic and tartaric acid. In the flask with bacterium No. 1, containing the highest percentage (1·03) of malic acid, (No. 5), only ·054 per cent. of acetic acid was formed after two months; whereas the culture (No. 4) with ·84 per cent. of malic acid contained 2·09 per cent. of acetic acid after two months. Similar proportions in a less pronounced degree are found in the experiments with tartaric acid (Nos. 8 and 9). The citric acid does not seem to have much retarding action in the proportions used, as will be seen by comparing Nos. 12 and 13. On the other hand even relatively small amounts of lactic acid act as a preventive against the development of the acetic acid bacteria. By looking through the figures in Nos. 14 to 17 it will be found that only very small quantities of acetic acid were produced in two months in comparison with the control (No. 1).

*Oil as a Preventive Against Acetification.*—A series of experiments has been carried out with thin layers of oil on the surface of cider to prevent the access of air, and, consequently, acetification. The oil, or, to be more correct, oily substance, used was in all cases liquid paraffin.

In the first instance flasks containing cider covered with a layer of liquid paraffin were sterilized and inoculated with the five types of acetic bacteria. The cider used had, after sterilization, a specific gravity of 1·019, and contained ·46 per cent. of malic acid, and 2·66 per cent. of alcohol. The inoculated flasks were placed at 25°C., and examined for the first time after one month. The result of the examination was that the acidity in the five flasks was the same as in the not-inoculated control sample. No acetic acid had been formed. All the flasks showed a very good development of the bacteria, with the usual films on the surface of the cider under the oil-cover. The flasks were examined after two months, with very nearly the same results, and it was not until after three months' keeping at 25°C. that small quantities of acetic acid were developed. No. 1 then contained ·08 per cent. of acetic acid, No. 3 ·036, and the three others only a feeble trace.

To ascertain the thickness of the oil-layer necessary to prevent acetification twelve flasks, each containing ½ litre of cider, the surface of which was covered with layers of oil of different thickness, were sterilized and all inoculated with Bacterium xylinum except one, which was kept as a control. The cider used gave, after sterilization, the following analysis: specific gravity 1·013, malic acid ·38 per cent., alcohol 2·72 per cent. The flasks were kept at room-temperature during the summer-months and examined after two, three, and four months. The bacteria developed well in all flasks, and there was no visible difference between the growth in the control-flask and in the flasks covered with a layer of oil. The results of the examination for acetic acid were as follows :—

| Flask No. | Liquid Paraffin added per square inch of surface. | Height of layer in inches. | Percentage of Acetic Acid present after | | |
|---|---|---|---|---|---|
| | | | 2 Months. | 3 Months. | 4 Months. |
| 0 (Control) | 0 | | 1·72 | 1·78 | 1·84 |
| 1 .. .. | ·05 ccm. | | 1·14 | 1·20 | 1·23 |
| 2 .. .. | ·10 ,, | | ·87 | ·91 | ·97 |
| 3 .. .. | ·15 ,, | | ·81 | ·84 | ·85 |
| 4 .. .. | ·20 ,, | | ·81 | ·85 | ·85 |
| 5 .. .. | ·25 ,, | 1/64th | ·60 | ·63 | ·70 |
| 6 .. .. | ·50 ,, | 1/32nd | ·50 | ·54 | ·58 |
| 7 .. .. | 1·00 ,, | 1/16th | ·30 | ·33 | ·36 |
| 8 .. .. | 2·00 ,, | ⅛ | ·096 | ·18 | ·19 |
| 9 .. .. | 4·00 ,, | ¼ | ·054 | ·09 | ·15 |
| 10 .. .. | 6·00 ,, | ⅜ | ·030 | ·058 | ·078 |
| 11 .. .. | 8·00 ,, | ½ | ·022 | ·036 | ·060 |

According to the above results, the formation of acetic acid is in inverse proportion to the thickness of the layer of liquid paraffin. The thicker the layer the less the production of acetic acid; and if the layer is one-fourth of an inch or more in thickness the acetification is negligible for practical purposes.

The experiment was repeated upon a larger scale. Three 6-gallon casks were filled about two-thirds full with the same cider. Cask No. 1 was closed with a bung in the usual way. On the surface of cask No. 2 was poured so much liquid paraffin that it formed a layer of about three-eighths of an inch thickness. Cask No. 3 was connected with a steel cylinder, containing liquid carbonic acid gas. All the casks were placed in a fairly warm room, and once a week a certain quantity of cider was drawn off through an inserted tap, each time letting the necessary air into Casks Nos. 1 and 2, whereas in No. 3 the cider was replaced with carbonic acid gas.

The casks were examined for acetic acid from time to time and the analyses gave the following results:—

| | Percentage Acetic Acid present after | | | | | |
|---|---|---|---|---|---|---|
| | 1 week | 2 weeks | 3 weeks | 4 weeks | 5 weeks | 6 weeks |
| Cask No. 1 | ·10 | ·25 | ·39 | ·54 | ·70 | ·76 |
| „ „ 2 | ·04 | ·04 | ·05 | ·06 | ·06 | ·06 |
| „ „ 3 | ·07 | ·10 | ·15 | ·16 | ·18 | ·18 |

In cask No. 1 the cider acetified rapidly, and became quite undrinkable after six weeks. In the case of cask No. 2 hardly any acetic acid was formed, and the cider was just as good at the end as at the beginning of the experiment. Cask No. 3 had a distinct acetic flavour after six weeks, but was much superior to No. 1.

The practical conclusions to be drawn from this investigation are that acetic bacteria are invariably present in ciders made under ordinary conditions, and that acetification will occur during storage in cask at normal or high temperatures unless special precautions are taken. Of these the simplest appears to be to cover the surface of the liquor with a layer of liquid paraffin or a tasteless and odourless oil, at least ¼ inch in depth. Slightly less efficient is the method of keeping the cider charged and covered with carbonic acid gas. The inhibitory action of lactic acid on the development of the acetic bacteria needs further investigation, since it may be found that by encouraging a slight lactic fermentation in cider the disorders of acetification and, perhaps, also, of sickness and ropiness may be controlled without serious detriment to the flavour of the liquor.

## THE PASTEURIZATION OF BOTTLED CIDER.

One of the greatest drawbacks with ordinary bottled cider is its uncertain keeping qualities. To some extent the difficulty can be overcome by selecting a cider of a suitable composition, a fairly high acidity being especially desirable, and also by bottling at the right moment. But even with the greatest care it is often found that after some time the bottled cider turns cloudy, develops "flyers," or undergoes other transformations. Practically all the disorders in bottled ciders are due to the development of some kind of living organism, either yeasts, bacteria, or moulds. Generally a very slow fermentation is considered desirable in the bottle, so as to keep the cider in a sparkling condition; but very often too much fermentation takes place and too large a deposit of yeast cells is formed, the cider losing the clear and brilliant appearance which is mostly required by the consumer.

In pasteurization, as it is commonly practised with many bottled liquids, *e.g.*, beer, milk, wine, and others, the filled and closed bottles are placed in suitably constructed water-baths, and the water is slowly heated to such a temperature that the living organism present in the content of the bottles are either killed or so much weakened in their vitality that their development is checked for a certain time. The temperature and the time of exposure vary according to the different liquids under treatment. The temperatures generally range between 140° and 180°F., and the time of exposure between five and thirty minutes. In the pasteurization of cider it is impossible to use such high temperatures, because of the cooked flavour which results; and, therefore, as will be seen from the experiments described below, much lower temperatures have been used, at the same time prolonging the time of exposure. By this method the cooked flavour does not appear to a serious extent.

It is evident that if the cider is to be sparkling after the pasteurization, it is necessary to charge it with carbonic acid gas before bottling, since no yeasts can develop in the bottles afterwards and, therefore, no fermentation and natural development of gas can take place. In the present experiments some of the cider was charged with carbonic acid gas and bottled at a pressure of 15lbs.; in some later experiments a pressure of 30lbs. was used.

It is necessary to use large corks of a good quality, and to wire them carefully. If the corks are inferior, the pressure created in the bottles by the rise of the temperature will force the gas out between the cork and the neck of the bottle. It is best to use paraffin-waxed corks.

The ciders used for the experiments were blends of different single variety ciders.

Blend No. 5 was made in the end of March, 1915, from nine different ciders, all filtered in the beginning of the year. The blend when used for the pasteurizing experiments in June had a specific gravity of 1·010, and contained ·41 per cent. of malic acid.

Blend No. 8 was made in April, 1915, from twelve different filtered ciders. It had a gravity of 1·010, and contained ·36 per cent. of malic acid.

Blend No. 4 was a mixture of Kingston Black and Cap of Liberty ciders. It had a specific gravity of 1·020, and contained ·65 per cent. of malic acid.

At the time of bottling the blends were not quite clear, as they had been in cask for over two months, and some fermentation had taken place. A microscopical examination showed plenty of living yeast-cells and some bacteria in all of them. This was considered an advantage in this connection, as it made the pasteurizing experiments more conclusive than would have been the case if the ciders had been brilliantly clear and consequently contained few organisms.

The experiments were carried out in the following way. After the bottles had been corked and wired they were stacked upon their sides in a large metal vessel, which was filled with cold water so that the bottles were well covered. The water was then slowly heated with steam, 30—40 minutes being taken to raise the temperature to the desired point. When the bottles had been kept as long as required at the pasteurizing temperatures they were taken out of the hot water, and left to cool.

The bottles of the three blends, both carbonated and uncarbonated, were kept at the following temperatures: A. at 45°C. (113°F.) for one hour; B. at 50°C. (122°F.) for half an hour; C. at 50°C. (122°F.) for one hour; D. at 55°C. (131°F.) for half-an-hour.

After pasteurization they were all kept for two months together with non-pasteurized control bottles before examination. The results were as follows:—

| BLEND 4 (Uncarbonated). | BLEND 4 (Carbonated). |
|---|---|
| Control: fairly large deposit. | Control: fairly large deposit. |
| A, B, C and D. Small deposit. | A, B, C and D. Small deposit. |

BLEND 5 (Uncarbonated).

Control: fairly large deposit, many "flyers."
A. Ditto.
B. Very little deposit.
C. Ditto.
D. Ditto.

BLEND 5 (Carbonated).

Control: rather large deposit.
A, B, C, D, hardly any deposit.

BLEND 8 (Uncarbonated).

Control: some deposit.
A. Small deposit.
B, C and D. Very little deposit.

BLEND 8 (Carbonated).

Control: small deposit.
A. Ditto.
B, C and D. Very little deposit.

The small deposits in the pasteurized samples, B, C and D, were due to the cider not being quite clear at the start of the experiment. No new development of organisms had taken place as was the case with the controls. In no case could a marked cooked flavour be detected. The uncarbonated samples were, of course, quite still, whereas most of the carbonated were sparkling, with the exception of some cases where the corks were defective.

To find out whether any living organisms were present after the pasteurization samples were taken asceptically from the deposits and introduced into small culture-flasks containing sterilized malt-extract. The flasks were placed in the incubator at 25°C. and examined after twenty-four hours, and again after two days and seven days, with the following results. The flasks with the samples from the deposits and liquids in the controls and the A. samples (kept for one hour at 113°F.) gave a vigorous fermentation and development of yeasts, torulæ, and bacteria after two days. The flasks inoculated from the deposits and liquids in the B, C, and D samples (kept at 122°F. and 131°F.) remained sterile after seven days. This indicates the possibility of pasteurizing ciders at low temperatures, *e.g.* 125° to 130°F., without altering their flavour seriously, provided that the ciders contain a certain amount of acidity (·4 to ·6 per cent. of malic acid), and that the bottles are kept at the mentioned temperature for a sufficiently long time, *i.e.*, one hour or more.

In connection with these pasteurizing experiments, the influence of a prolonged exposure to similar temperatures was tried upon vigorous cultures of some of the most common bacteria causing disorders in cider. The bacteria used were Bacterium xylinum, Acetic Bacterium No. 4, and the sickness bacillus. Young cultures of the bacteria were kept at the different temperatures, and afterwards transferred to flasks, with a nutrient medium, which were placed in the incubator. These new cultures were examined after three days, six days, and fourteen days, the results being as follows:

Cultures at 50°C. for thirty minutes: After fourteen days all the flasks with sickness-bacillus and bacterium No. 4 showed development. No development in the flasks with Bacterium xylinum.

Cultures at 50°C. for one hour: Same result as above. Consequently the exposure to a temperature of 50°C. for one hour was not sufficient to kill the sickness bacillus or the bacterium No. 4. Only Bacterium xylinum succumbed.

The experiments were repeated, using the same media (yeast-water and 5 per cent. glucose) but adding ·1, ·2, ·3, ·4 and ·6 per cent. of malic acid to test the influence of temperature and acidity combined. It was found that an exposure to 50°C. for one hour in a liquid containing ·3 per cent. or more of malic acid was in all cases sufficient to kill the sickness bacillus and Bacterium Xylinum, whereas under the same temperature conditions Bacterium No. 4 was only killed when the liquid contained ·6 per cent. of acid. It must be remembered that the bacteria were cultivated in a medium which was especially favourable for their development, and that young and very vigorous cultures were used. Similar favourable conditions do not exist in cider.

It appears, therefore, that an efficient pasteurization of bottled cider can be effected without serious harm to flavour by exposure to a comparatively low temperature for a sufficiently long period. The comparatively slight alteration in flavour which is produced, would probably be passed without notice by the average consumer who was not a connoisseur of cider: and, on that account, the method, even as it stands after so short an investigation, may be recommended for trial to bottlers of cider who regularly experience trouble with cider sickness and other disorders. It is quite possible, however, that this slight flavour drawback may be overcome, since there is already reason to anticipate that, after long standing in bottle, the treated cider will lose the greater part, if not the whole, of the acquired flavour.

## EXPERIMENTS TO STOP FERMENTATION IN CIDER.

A few preliminary experiments have been made with the object of finding, if possible, a suitable substitute for the filter as an agent to stop fermentation when desired. The action of the filter is to remove the yeast-cells from the cider, thereby checking or, in many cases, very nearly stopping the fermentation. It is very improbable that a medium to separate the yeast-cells from the cider to the same extent as is possible by using a good filter will be found; but where no filter is available a substitute would be of value, if, when added in certain proportions to the cider, it could precipitate the yeast-cells suspended in the liquid so as to make them form a deposit from which the clear cider could be racked.

The experiments were carried out with a juice made from Lambrook Pippin apples. The juice had a specific gravity of 1·044, and contained ·50 per cent. of malic acid, and ·18 per cent. of tannin. The juice was filled into large glass jars, each containing eight litres. The jars were closed with a fermentation trap and allowed to ferment until the specific gravity had fallen to 1·029. The liquid in all the flasks, except one kept as a control, was then syphoned from the deposit into slightly smaller flasks, and the addition of the clearing media was made in the proportions mentioned below, these having first been found by preliminary experiments upon a small scale to give the best clearing.

| | | |
|---|---|---|
| No. 1 | (Control). | |
| No. 2 | Racked. | |
| No. 3 | 5 grams of Gelatine added .. | .. per 100 litres. |
| No. 4 | 40 grams Phosphate of Calcium ,, | .. ,, ,, |
| No. 5 | 10 grams Caseine ,, .. | .. ,, ,, |
| No. 6 | 2 whites of egg ,, .. | .. ,, ,, |
| No. 7 | 2 grams of Tannin, 4 grams of Gelatine .. | ,, ,, |
| No. 8 | Apple-pectin ,, | |
| No. 9 | 5 grams of Isinglass ,, .. | .. ,, ,, |
| No. 10 | 300 grams of Kaolin ,, .. | .. ,, ,, |
| No. 11 | Filtered. | |

The flasks were kept at room temperature for some time, and from each some bottles were filled.

At the time of bottling :

| | | | |
|---|---|---|---|
| Sample | No. 1 | had a specific gravity of | 1·017, not quite clear; very large, loose deposit. |
| ,, | No. 2 | ,, ,, ,, | 1·024, very nearly clear; thin hard, deposit. |
| ,, | No. 3 | ,, ,, ,, | 1·025, not quite clear; large, loose deposit. |
| ,, | No. 4 | ,, ,, ,, | 1·024, very nearly clear: thin hard deposit. |
| ,, | No. 5 | ,, ,, ,, | 1·027, not clear; fairly large, loose deposit. |
| ,, | No. 6 | ,, ,, ,, | 1·019, very nearly clear; large, loose deposit. |
| ,, | No. 7 | ,, ,, ,, | 1·023, very nearly clear; large, loose deposit. |
| ,, | No. 8 | ,, ,, ,, | 1·028, very nearly clear; fairly large, very loose deposit. |
| ,, | No. 9 | ,, ,, ,, | 1·016, not clear; fairly large, loose deposit. |
| ,, | No. 10 | ,, ,, ,, | 1·018, very nearly clear; fairly large, hard deposit. |
| ,, | No. 11 | ,, ,, ,, | 1·025, perfectly clear; very little deposit. |

After three months the bottles were examined, with the result that, with the exception of the filtered sample, they were all cloudy with large deposits, too much fermentation had taken place, and the cider had lost most of its sweetness. Only the filtered sample remained clear, with very little deposit, and a drop in specific gravity of not more than three points. This demonstrates the very great superiority of the filter over the other agents employed to separate the yeast and stop fermentation, and the difficulty of adequately controlling fermentation without it, assuming that no preservatives are used.

## OZONAIR AGAINST CIDER SICKNESS.

Acting on the suggestion of the Ozonair Company, Limited, some experiments were carried out to test the action of Ozonair upon the bacillus causing cider sickness.

Ozonair is used as a disinfectant, and is made by passing air through a specially constructed apparatus where electric discharges take place, thereby transforming some of the oxygen in the air into ozone. Ozonair can be used in different concentrations. The concentration employed for the first set of experiments was ·26 per cent. of ozone in the Ozonair.

The bacillus was cultivated in cider, malt-extract, and yeast water-glucose, and the experiment was carried out in such a way that the Ozonair was allowed to bubble through the cultures for thirty seconds, one, two, three, five, ten, fifteen, and twenty minutes respectively. Afterwards a sample was taken from each of the treated cultures and introduced into a flask with sterile media. The flasks were placed in the incubator at 25°C. After three days there was a development of the bacillus in all cases. Consequently the Ozonair in the concentration used had had no killing action upon the sickness bacillus. Later a culture was exposed to treatment with Ozonair of very high concentration, and in that case the bacillus was killed. Further experiments are necessary to find the exact concentration required for the purpose; but it is uncertain whether this treatment with strong Ozonair is liable to alter the flavour of the cider.

## PLUM WINE.

The experiment mentioned in last year's report to make a kind of wine from the Pershore egg-plum has been repeated upon a larger scale during this season.

The plums were made up in the following way: 650lbs. of plums were passed through the grater cider mill, which had been arranged so as to leave a passage of about ½ inch between the drum with the grating knives and the counter-weight. The plums passed through very rapidly, and although a certain amount went through without breaking the stones, probably half of the stones were broken, but as a rule not completely ground up, so that in most cases the kernels came through entire. Too many broken kernels would probably make the wine bitter. The grated plums were put into an open tub and to them were added 30 gallons of water in which previously 56lbs. of sugar had been dissolved. The whole was thoroughly mixed, and an average sample taken out for analysis. The juice had a specific gravity of 1·051, and contained ·79 per cent. of acid, and 12·5 per cent. of total sugar.

The mixture was left for two days in the open vessel, with a disc of wood resting on the surface, so as to prevent the crushed plums from rising to the top. The whole was stirred up several times during the maceration. The fermenting mass was then pressed in the usual way with a cider press, and the juice was collected in a cask and left to ferment in the cellar at a temperature of about 60°F. The yield of juice was 64 gallons.

Fermentation was very vigorous, and only six days after pressing the specific gravity had fallen to 1·028, and the juice was filtered. It came through the filter completely clear, and was put into a cask. Fermentation started again, and it was necessary to filter a second time six weeks later, when the specific gravity had fallen to 1·012.

The resulting wine lacks body, but has a pleasant, clean, and brisk flavour, with a pronounced taste of the plum. It keeps very well, and at the present moment, five months after making, it is perfectly clear, with a little deposit, has a specific gravity of 1·011, and contains ·56 per cent. of acid and 4·12 per cent. of alcohol. Although at present a definite commercial value could not be placed upon it, there seems a reasonable prospect for anticipating that a beverage of this kind could be turned to profitable account.

## APPLE PECTINS AND THEIR USES.

The chemical composition of the apple has from time to time been extensively investigated. It is, however, the case that although certain aspects of the question, concerned mainly with the sugars and acids of the fruit, have been well studied, comparatively little is known as to its composition in respect of some of the other constituents. Many analyses of different kinds of apples and their juices have been made by various workers, both in this country and abroad; but the majority relate to cider fruit, and are concerned chiefly with the quantities of sugar, acid, and tannin present, these being the substances of primary importance for cider-making. Several thousand analyses of this kind have been made at the Institute since its establishment in 1904; but while they have furnished much information as to the normal composition of English vintage apples and its variation owing to seasonal and other factors, they do not deal with any constituents other than those mentioned. Included among the comparatively neglected constituents is the group of substances which may be classed together under the general name of pectins.

The pectins, which are closely associated with the cellulose of the walls of the cells of the fruit, and are believed to serve largely, if not exclusively, as the cementing material which binds the walls of the individual cells together, are bodies which are generally regarded as carbohydrates or related substances and can ultimately be converted into a form of sugar, probably identical with arabinose. On account of their general physical character and of their tendency to form compounds of a gelatinous nature, they are sometimes referred to as the mucilaginous elements of the fruit: and they are the cause of the semi-viscid or slimy condition of the pulp of an apple, familiar to anyone who has handled one in an over-ripe state.

These substances are important constituents of the apple in several connections. As carbohydrates or related substances, they may be regarded as possessing definite food value. In the jam-making industry their value is well recognised on account of their property of assisting jam to set or "gel" firmly. Similarly, in the making of apple jelly it is these bodies which cause this article to set. In cider-making they are sometimes of considerable assistance and on other occasions cause much trouble. The phenomenon of "dropping bright," of which most cider-makers have at one time or another had some experience, is undoubtedly associated with certain changes taking place in the pectin constituents of the juice. In many ciders, bottled comparatively early in the season, troublesome light flocculent deposits are formed. These, again, are probably associated with pectin changes.

During the course of the work on the making of cider-apple jelly, the method for which was given in last year's Report, it became evident that, while the pectins of the apple juice caused the formation of the jelly, they could not be relied on in all cases to give the same kind of result when a uniform method of making the jelly was adopted. Sometimes a good jelly was produced. In other instances a thin semi-liquid jelly resulted. Occasionally the concentrated juice failed entirely to set. In such examples it was found that when an extract of apple pomace, prepared by boiling it with a limited quantity of water or apple juice for some time, was added to the juice which would not set, the latter would, after a little further boiling, form a firm jelly. Even, however, when this pomace extract was used the results were not entirely uniform. An investigation of the pectins of the apple was, therefore, started, and is now proceeding. Since the work is still far from complete it is not proposed to deal here with it in detail: but a summary of some of the more interesting points bearing on practical questions arising in the making of jam and fruit jellies and of cider is given.

The three principal objects of the investigation were to obtain knowledge of the pectins of the apple and their changes during the ripening of the fruit, to determine the parts played by them in causing the setting of jams and jellies, and to ascertain more exactly their history and fate during the making of cider. In addition there was the possibility that a pectin-containing product might be prepared from pressed apple pomace, which might prove of service in the jam-making and cider industries.

So far as the pectins themselves are concerned, they are generally regarded by bio-chemists as being derived in the first instance from an insoluble substance, pectose, which is produced in young plant tissues in association with cellulose. Pectose, in the course of the development of these tissues, apparently undergoes changes leading to the formation of two classes of substances. One class, pectine and its derivatives, is neutral in character: and the other, a series of pectic acids, is slightly acidic, and forms gelatinous insoluble salts with various bases. Since both in jam-making and in cider-making one is concerned ultimately only with soluble forms of pectin, either in the juice or in an aqueous extract of the fruit pulp, reference will be confined here solely to those forms.

On the addition of an excess of strong alcohol to freshly pressed apple juice or to an aqueous extract of apple pulp a gelatinous precipitate is formed. The amount of this precipitate probably represents the quantity of pectins in the original liquid. If the aqueous extract contains much pectin, the addition of the alcohol causes the whole to set in a semi-solid gelatinous mass. After filtration and the removal by pressure of the alcohol retained by the gelatinous mass, this substance is found to be more or less readily soluble in water. The addition of an excess of caustic soda to its aqueous solution produces a bulky gelatinous precipitate, or, if the solution is strong enough, the mixture forms a firm jelly. Ammonia added to a strong aqueous solution sometimes causes the latter gradually to set to a jelly; but the results in this direction have been variable. A concentrated solution of ammonium sulphate also precipitates the pectin from strong aqueous solutions in the form of a jelly. Solutions of salts of the heavier metals give gelatinous precipitates. Acetone precipitates the pectins from aqueous solutions in the same manner as alcohol.

The soluble pectins of the apple thus produce gels readily and rapidly with the aid of a variety of chemical reagents: and the question arises as to whether the setting of jams and jellies is brought about by actions of that type or whether it is merely due to the concentration of the pectins of those articles by the boiling to which they are subjected.

The composition of a jam is, relatively, simple, consisting primarily of the sugar of the fruit, plus the added sugar,—making, in all, about 60–70 per cent. of sugar—the fruit acids, equivalent to about 1 per cent. tartaric acid, the fruit pectins, and the insoluble cellulose and other residual elements of the fruit tissues. The latter bodies may probably be ruled out of account so far as the gelling phenomena proper are concerned, on account of their insolubility. Fruit jellies are of substantially the same composition as the jams with the omission of the insoluble elements.

The gelling of the jams and jellies is presumably due either to the concentration and possible chemical changes of the pectins resulting from the boiling, or to the action of the sugars or acids, or of both in combination, on the pectins. The former alternative, which at first sight may seem to be the more likely, appears to be definitely disproved by the fact that the pectin extracts of apple pulp do not gel, however far they may be concentrated by boiling. It is possible by concentration of aqueous pectin extracts under suitable conditions to obtain the pectins in solid form, but at no time during concentration does the extract approach a true gel in character, remaining throughout a more or less viscous fluid. The action of various sugars in combination with pectin extracts has been examined. Here, again, no true gel resulted either before or after boiling, whatever the proportions of sugar and pectin used. The invariable result was a viscous syrup. Various fruit acids, such as tartaric, citric and malic, were then tested similarly with the pectin extracts. In no case was a gel produced. An entirely different result was, however, obtained when the effect of sugar and acid in combination was tested. Solutions of pectin, to which sugar, (either dextrose or cane sugar), was added at the rate of 60–70 per cent., were boiled for a few minutes, and then tartaric acid at the rate of 1 per cent. was also added, and the mixture re-heated. In a few moments the first signs of gel formation became apparent, and on standing for a short time the mixture quickly set to a firm jelly. The same type of experiment has been frequently repeated since in various forms, and invariably the result has been similar. It seems clear, therefore, that the gel formation in the making of jams and fruit jellies is caused by the joint action of the fruit acids and sugars on the pectins.

That being the case, the fact that sometimes jams and jellies fail to set, although made apparently under the same conditions as successful ones, requires explanation. The example of certain types of cider apple jelly, referred to above, which set on addition of pomace extract, but would not do so without it, suggests that in some cases at least the fault in the original mixture may be insufficient pectin. A lack of pectin in the finished article can result from a variety of causes. There may be a deficiency of pectins in the fruit at the start : or, since pectins probably undergo considerable changes in character during the course of ripening of the fruit, the types of pectin present may be unsuitable for gel formation under the conditions of jam-making. Then, again, while suitable pectins in sufficient quantity may be present at the outset, decomposition or precipitation may occur during boiling. There is good reason to suppose that each of these possibilities occurs from time to time in practice owing to some slight variation from standard conditions which, owing to the present limited knowledge of the subject, may have escaped detection.

As already stated, however, the addition of pomace extract to concentrated apple juice does not invariably cause it to gel : and in such instances the failure cannot be attributed to lack of pectins, unless, indeed, those in the pomace extract are precipitated at the time of addition. This possibility doubtless occurs occasionally : but cases have come under observation where there was no sign of precipitation. The failure to gel must, therefore, in some instances, be due to other causes. Many experiments on this point have been made, and some very interesting results recorded. Detailed reference to this part of the work would occupy too much space here, and further investigation is also necessary. The main conclusion thus far reached is that in a comparatively complex mixture of substances, such as a concentrated fruit juice, a certain balance between sugars, acids, and pectins, is necessary to obtain a complete gel. There is a minimum quantity of each of those substances which must be present, if a gel in any form is to be produced. So far as the sugars and pectins are concerned, the increase of either constituent above that minimum quantity without a corresponding increase in the amount of the other *may* result in a failure to gel properly, this depending on the extent of the increase. If both constituents are increased proportionately, the gelling character is retained unimpaired ; and in such cases the greater the increase the stiffer the gel.

Before passing from this part of the subject it may be mentioned that it has quite recently been found possible to produce these gels from sugar—acid—pectin mixtures without the aid of heat. This fact opens up a number of interesting possibilities in connection with the use of apple pectin for a variety of purposes. Another fact of interest discovered is that glycerine, which is chemically a very simple form of sugar, can be used in the place of other sugars for these gel productions.

Since in freshly pressed apple juice there is a mixture of sugars, malic acid, and pectins, the possibility of their interaction to produce the jelly-like clot which is the precursor of " dropping bright " in cider, suggests itself. In the Annual Report for 1904 the subject of " dropping bright " was briefly dealt with, and it was there shown that the phenomenon was caused by changes in the pectins in solution in the apple juice, which resulted in the formation of a jelly-like clot and a mechanical clearing of the liquor thereby. Mainly from analogy with somewhat similar pectin changes in other plant juices and extracts which had been more extensively investigated, it was concluded that the conversion of the soluble pectins of the apple juice into the insoluble gelatinous form was effected by the action of pectase, a special type of enzyme, which has the power of converting some of the soluble pectins into insoluble gels in neutral or very slightly acid liquids. Its action is inhibited if the acidity is appreciable. This interpretation corresponded well with the facts at that time available, since " dropping bright " in that form had been observed only in the cases of juices from sweet and bitter-sweet varieties of apples, the acidity of which is normally very low. Since that time, however, other types of " dropping bright " and gel formation in ciders and perries have been met with, chiefly in cases where the acidity was sufficiently high to make it improbable that pectase action was responsible. It seemed desirable, therefore, to make a further investigation of the subject in the light of the better knowledge of the pectins now available. This work has not yet been completed : but it has been carried sufficiently far to prove that there has been present in the juices already examined sufficient pectase to cause the " dropping bright " phenomena when the acidity was low enough naturally, or when it was reduced to the necessary degree by partial neutralisation with calcium carbonate. The addition of a small proportion of freshly pressed apple juice, or a few particles of pomace, to crude pectin extracts obtained from pressed pomace caused these to set to a firm jelly within twenty-four hours at 25°C., when the mixture was completely neutralised with calcium carbonate. Similarly the addition of limited quantities of such extracts to freshly pressed apple juices produced "dropping bright" in the latter, when the acidity was sufficiently reduced. It seems evident then that pectase plays a part in the "dropping bright" of ciders of low acidity. In the other types of "dropping bright," where the acidity is relatively high and pectose action on that account presumably negligible, the sugar-acid-pectin interaction may have to be taken into consideration. The possibility that another enzyme is concerned, acting in a corresponding way to pectase, but working in a high acid medium instead of a low acid one, must be borne in mind: but at present, owing to the infrequency with which these types occur, it has not been possible to obtain definite evidence either way.

A peculiar form of "dropping bright" in perry has been rather more completely investigated. This type, which is probably familiar to all makers of perry working with pears of the Oldfield class, is most frequently seen in bottled perry, although it occurs also in perry in cask. The usual manner of its development is as follows. The liquor, perfectly clear when bottled, gradually becomes hazy, and in due course densely turbid, resembling at that stage in appearance and colour a milky fluid. Later, a complete natural clearing takes place, the substance causing the milkiness being gradually deposited in the form of an opaque, cream-coloured, jelly-like crust on the sides and bottom of the bottle. The liquor eventually is left in perfectly brilliant condition. The nature of the crust strongly suggests at first sight that it is a pectin compound; but at present none of the ordinary pectin reactions have been obtained with it. On the other hand, the crust gives to a marked degree certain reactions which are characteristic of the tannins which occur in perry pears; and it must be concluded that in this case it is this group of substances which is responsible for the "dropping bright." This result corresponds with those of Kelhofer, who, working with certain Swiss-grown varieties of pears, observed a series of changes in their juices which closely resembled some of the "dropping bright" phenomena here referred to, and traced them to the action of the pear tannins. Further reference to this subject will be made in a later report.

From what has now been stated some idea can be formed as to the importance of the pectin group of substances in the making of both jam and cider. It appears highly probable that, if certain of the apple pectins could be extracted from the fruit in a fairly pure form, they could be utilised with advantage in the jam and cider industries, and, perhaps, also in certain other directions. Every year large quantities of pressed cider apple pomace are produced in this country, and in many cases so little use is made of it that it is practically a waste bye-product. It contains considerable quantities of the pectins in question, and would form a very cheap source of them in the event of their becoming of commercial value. Consequently, concurrently with these investigations on the nature and properties of apple pectins attempts have been made to extract in suitable form these substances from pressed pomace. Many methods have been tried, but most of them have given unsatisfactory results, due not so much to any difficulty in extracting the pectins as to the presence of a flavour in the extract which seriously marred its value for the purposes required. Recently, however, a method has been found by which a crude extract of the pectins in concentrated form, and free from any marked prejudicial flavour can be readily prepared: and from this a pectin preparation in solid form and not liable to decomposition has been produced.

An American product, stated to consist of apple pectins, has been lately put on the market for use in the jam industry for gelling purposes. The utility of an article of this kind has been admitted. The article in question is in liquid form, and, like other liquid pectin extracts, is apt to ferment readily. A stable pectin in solid form, such as that which has now been obtained from apple pomace, should, therefore, possess distinct commercial possibilities.

## APPLE ROOT STOCK INVESTIGATIONS.

In the last report of the Institute a preliminary account was given of the work which had been started in connection with apple stocks, especially those of the "free" and "crab" classes: the following is a summary of the progress of these investigations up to the present time.

In the spring of 1914 examination was made at Long Ashton of a large number of crab and free stocks which have been collected from various sources. The root system of these stocks varies very widely. The two extreme types found are, in the one case, a root system which consists almost entirely of a few little-branched strong roots of the tap-root type, lacking in fibre and laterals. At the other extreme there is little sign of any coarse tap-root growth, the root system consisting almost entirely of a mass of fine fibres given off from the base of the stem and from the original weakly-developed main root. Between these two types all grades of variations have been found. There are coarse-rooted types, more branched than in the extreme cases, and showing rather more laterals and more fibre. Proceeding further in the scale, a stage is found in which the main roots are less coarse, the lateral system more strongly developed, and the fibres more numerous. In other cases the development of laterals is the striking feature, the main root system being comparatively little developed. Further along the scale a type is reached in which the laterals, although very numerous, are less strong, and a very large development of fibre is present. In such cases there is very little evidence of any main root system. Undoubtedly, the most interesting types at present are those in which the roots consist of a mass of fibrous roots, which are given out both from the original main root and the base of the stem. Members of this class evidently approach the Paradise type very nearly, and it is possible that further experience will show that some of them may prove as useful as the types of Paradise stock more commonly used. A system of classification was devised, and the stocks were put in different classes in accordance with the different characters of their root systems; about eight classes were recognised.

In March, 1915, the same stocks were again examined, and it was found that, in general, the classification made in the previous year still held good after the stocks had made another year's growth. The character of the root system of each individual stock was noted, and special notice was taken of those which showed signs of stem-rooting. Root-cuttings were taken from the most promising members of each class, and a large number of these have grown successfully. On re-planting the stocks the stems were cut back to about nine inches from the ground, and were earthed-up in summer after the growth of the lateral shoots: by this means stem rooting was encouraged, and hence it was possible, after further examination, to pick out the stocks which seem likely to strike readily from cuttings and layers. Observation of the most promising stocks of various types, and attempts to propagate them, will be continued this year.

### STRAWBERRY STOCK EXPERIMENTS.

In the spring of 1913, when a new plantation of small fruits was established at the Institute, a series of experiments with Royal Sovereign strawberry plants was started. The main object of the experiments was to determine if the locality from which the runners were obtained influenced in any way the subsequent growth of the plants and their cropping qualities. It has already been conclusively established in the case of potatoes that the district from which the "seed" is obtained has a marked effect on the size of the resulting crop: and it was thought possible that something of the same kind might occur with strawberries.

The plot of ground selected for the experiment was about one quarter of an acre in extent. It was planted at the same time with young black currant bushes, in rows at 5 feet apart, the rows of strawberries alternating with those of the currants. The distance between individual strawberry plants in the rows was 2 feet, there being 100 plants in each row. The whole of a single row of plants were obtained from the same nursery, the plants being runners taken during the previous summer. Each row was obtained from a different nursery, the sources being selected so as to represent as many widely separated districts or types of soil of the British Isles as possible, while in two cases the plants were obtained from Jersey and the Orleans district of France respectively. Altogether there were 12 rows, representing the same number of different localities.

The plants were not allowed to bear any fruit in 1913: but good crops were produced in 1914 and 1915, statistics of the yields being given in the following table. Unfortunately in the latter year, before picking had been quite completed, the small proportion of the crop left ungathered was completely ruined by the severe hailstorm of June 27th, and the weights given do not, therefore, quite indicate the actual size of the crop: but, so far as would be judged, each row was affected to about the same proportionate degree, and the crop weights given for 1915 can, probably, be compared with one another without serious error. It had been originally intended to continue the experiment to 1916 for a third season of cropping: but the growth of the currants with which the strawberries were interplanted rendered it undesirable. The results of the experiment are, therefore, based on the crops from the plants in their second and third seasons, the actual weights being given in the table on the opposite page.

The figures given for the plants from Norfolk and Scotland are, undoubtedly, lower than they would have been, had these plants been put out at the same time as the remainder. They were planted later owing to a new drain passing across that part of the plantation not being completed in time. The French strain was impure, and the results are thus not strictly comparable with the others.

The results, as a whole, show unexpectedly large differences between the individual strains, the Jersey plants being far ahead of the remainder in both seasons; but even if this be considered an abnormal case, there still remain relatively large and important differences between the others. One point seems clearly brought out, this being that the heavier croppers in 1914 by no means invariably retained their superiority in the following year.

The difficulties of obtaining consistent results in experiments on strawberries are well recognised by those who have had experience with them: and it is not intended here to attempt to draw any positive conclusions from the present series of experiments. They should be regarded as in the nature of a preliminary trial, which has yielded results of a decided character; and the consideration of the real bearing of the latter may be left until the results of supplementary experiments are available. A case for further investigation has certainly been established, and this is already in progress.

| Source of Plants. | Weights of Crop in lbs. | | |
|---|---|---|---|
| | 1914 | 1915 | Total. |
| Devon .. .. .. .. | $18\frac{7}{8}$ | $57\frac{1}{2}$ | $76\frac{3}{8}$ |
| France .. .. .. .. | $21\frac{15}{16}$ | 43 | $64\frac{15}{16}$ |
| Hampshire .. .. .. | $21\frac{11}{16}$ | $47\frac{3}{4}$ | $69\frac{7}{16}$ |
| Hereford .. .. .. .. | $19\frac{5}{16}$ | 42 | $61\frac{5}{16}$ |
| Ireland .. .. .. .. | $16\frac{3}{16}$ | $55\frac{1}{2}$ | $71\frac{11}{16}$ |
| Jersey .. .. .. .. | $39\frac{3}{8}$ | $83\frac{1}{2}$ | $122\frac{7}{8}$ |
| Kent (mid.) .. .. .. | $23\frac{1}{4}$ | $52\frac{3}{4}$ | 76 |
| ,, (south) .. .. .. | $16\frac{15}{16}$ | $71\frac{1}{2}$ | $88\frac{7}{16}$ |
| Norfolk .. .. .. .. | $10\frac{1}{2}$ | $34\frac{1}{2}$ | 45 |
| Scotland .. .. .. .. | $15\frac{13}{16}$ | $58\frac{1}{2}$ | $74\frac{5}{16}$ |
| Yorkshire .. .. .. | $19\frac{7}{16}$ | 47 | $66\frac{7}{16}$ |
| ,, .. .. .. .. | $20\frac{13}{16}$ | 55 | $75\frac{13}{16}$ |

## SUMMER SPRAYING TREATMENT OF AMERICAN GOOSEBERRY MILDEW.

In the Annual Report of the Institute for 1914, a short account of some spraying experiments on the summer stage of American Gooseberry Mildew was given. The object of this work was to find, if possible, a method which would suffice to hold in check the summer growth of this parasite, and thereby prevent or sufficiently reduce the formation of the winter stage, so as to delay the outbreak of the disease the following season until the fruit was safe from attack, even if failing to stop an outbreak absolutely. The results of these experiments showed clearly that, so far as treatment by spray fluids was concerned, the efficiency of the treatment depended very largely upon the wetting power of the fluid used. The summer stage of the fungus is practically entirely superficial on the host plant, and can be readily killed by any of the ordinary contact fungicides, provided that the latter actually wet the cell-walls of the condia and hyphæ of the parasite. The failure of the numerous attempts which have been made by previous workers to control the disease by summer spraying with various standard fungicides, is almost certainly due primarily to the fungicide applied never coming into actual contact with many of the cells of the fungus. The nature of the growth of the fungus is responsible for this, the drops of the spray fluid failing to wet it owing to the inclusion of air among the superficial growths of the mildew.

One of the chief points in the work carried on during the summer of 1914, therefore, was to find a spray fluid capable of thoroughly wetting the fungus so that every cell should be bathed with it. Of all the fluids tested for efficiency of wetting none could compare with a soft soap-paraffin emulsion containing 2 per cent. of each of these ingredients. As the trials made that season showed, this emulsion, although not generally regarded as a fungicide, possessed to some degree fungicidal properties. These, after further investigation in 1915, were considered to be hardly adequate for the purpose required, and the effect of the addition of a small quantity of liver of sulphur was tested. This was found to increase to the desired extent the fungicidal quality of the spray fluid without detracting from its wetting qualities. This mixture was therefore selected for use for the 1915 spraying experiments, the actual formula used being as follows :—

Soft soap, 20lbs.
Paraffin, 2 gallons.
Liver of Sulphur, 3¼lbs. (approximately).
Water, 100 gallons.

The amount of liver of sulphur can only be stated approximately as the material was not absolutely fresh. A strength of 1lb. per 28 gallons was aimed at, since it was thought that anywhere between the limits of 1 in 26 and 1 in 30 both killing power and freedom from burning would be secured in the mixture.

The main experiment in 1915 was the trial of this spray fluid on a practical scale in a gooseberry plantation in the neighbourhood of Weston-super-Mare, which had suffered severely the previous year from an outbreak of the disease. As anticipated, the disease appeared again in 1915 towards the end of May, and by the middle of June the attack had become severe. The varieties of gooseberries grown in the plantation were Whinham's Industry and Keepsake. The berries of the former were so badly covered with the disease that they were left ungathered on the bushes. The young shoots and foliage of both varieties were also rather badly attacked. At this point a thorough spraying with the above mixture was given, great care being taken to ensure that the bushes were completely wetted with the fluid. An examination of the bushes a week later showed that the fungus had been practically wiped out by the treatment. On none of the berries was any living material found, and it was only after a careful search that any was discovered on the young shoots. These patches, which were very rare and extremely limited in extent, were probably portions which had escaped complete wetting by the spray fluid. There was an almost complete absence of any scorching of the foliage of the bushes, and no sign of defoliation. The plantation was visited periodically throughout the summer, but no further spraying was deemed necessary. A very slight additional growth of the fungus appeared on a few of the young shoots, but the total amount was practically negligible.

In the autumn these affected shoots bore a few perithecia, but in none of these were ripe spores observed. They appeared to be lacking in vitality. It now remains to be seen how far this treatment will affect the course of the disease during 1916.

The absence of a second outbreak of the summer stage was somewhat unexpected, since from the severity of the initial attack it had been anticipated that a second spraying would be required to hold the disease in check. Probably the weather conditions were to some extent responsible. There was a heavy crop of berries, and the early summer drought caused the young growths to ripen quickly, and very little subsequent growth occurred. The bushes were thus not in a very susceptible condition for further attack. Making due allowance for this, however, the spraying undoubtedly had a drastic effect on the disease: and there appears to be more promise of successful control by this method than by any others hitherto recorded. Before a satisfactory estimate of its value can be formed it is necessary to test it under a variety of conditions, particularly on bushes making more succulent growth than those treated in 1915.

## TREATMENT OF BIG BUD.

Attempts to find a satisfactory treatment against Big Bud disease of Black Currants were continued this season. Last season vaseline emulsions were tried in the hope of preventing migration. From many points of view the method, as then tried, was impracticable.

While experimenting in another direction it was discovered by accident that strong soft soap solutions had a considerable power of penetration into big buds. The original observation was made in December, on some material indoors, where the temperature was considerably higher than that outside. This suggested the possibility of attacking the mites before migration from the buds took place. At first an attempt to penetrate the buds on bushes growing outside was a complete failure; but, pending the slight opening of the big buds, which occurs early in the spring, experiments were conducted indoors to find the best conditions for spraying. These conditions were obviously those that gave greatest opening of the big buds. At first the mistake was made of taking any big bud material that came to hand, whether from an old or young bush, and no account was taken of the variety. This led to considerable confusion, which was only cleared up when twigs from one bush only were used for experiment.

The following factors were then found to exert influence on the possibility of penetration of spray fluid into the big bud :—

(*a*) *Root pressure.*

This, as was to be expected, only made itself felt gradually, but is a very important force. Until the root pressure begins to increase early in the spring, practically no penetration could be secured out-of-doors.

(*b*) *Variety.*

Some varieties remained difficult to penetrate, even at so late a time that the normal buds were beginning to shoot.

The varieties sprayed were Ogden's Black, Boskoop Giant, Black Prince, Victoria, and Goliath. Of these, Boskoop Giant is especially difficult to penetrate.

(*c*) *Age of Bushes.*

On the whole young vigorously growing bushes are rather harder to penetrate than older bushes of the same variety. There is not, however, a great deal of difference.

### (*d*) *Temperature.*

This does not appear to play an important part in causing opening of the big buds on bushes outside.

### *Spray Material.*

The strength of the soft soap solution should not be less than 10 per cent. (10lbs. per 10 gallons). The use of 20 per cent. or of 10 per cent. paraffin emulsion did not greatly enhance the penetrating power of the solution. Rainy weather following shortly after spraying greatly increased its efficacy.

The laboratory tests on the effectiveness of the spray fluid were made by dipping cut-off shoots into the solution to be tested, which had been previously deeply dyed with a stain, such as eosin. The shoots were then allowed to dry, after which the big buds were divided vertically down the middle. They were then microscopically examined, and the penetration of the fluid judged from the stained tissues.

Penetration largely takes place at the bottom of the outermost bud scales, and not nearly so frequently from the apex of the bud as would be naturally expected.

When spraying a bush, or part of a bush, in the plantations, the spray solution was also deeply coloured with a stain. Unfortunately, even in the spring, when the normal buds began to open, perfect penetration of the big buds could not be obtained. The best conditions were caused by rain following the application of the spray. The buds then became full of diluted soft soap solution, which completely drowned the mites. Soft soap solution appeared to have no direct action on the mites, as they could live in 20 per cent. solution for some considerable time, death only occurring from drowning.

In judging the effectiveness of penetration the following method was adopted. Buds were divided roughly into three kinds, those not or only very little penetrated, those slightly too well penetrated, and those completely penetrated. By a rough system of marks, corresponding to these divisions, some idea of the effectiveness could be judged. Even in the spring it was not often that more than 50 per cent. to 75 per cent. penetration could be obtained, and it was owing to this that attempts were made to combine the soap solution with a substance that should poison by its vapour. Some number of substances were tried, among the most successful of which was oil of mirbane. By its means mites that had not been reached by the soft soap were apparently killed. Unfortunately, however, subsequent examination showed that they were only anæsthetised. Buds were treated with an emulsion of oil of mirbane in soap. Those opened after the first day showed motionless mites, which recovered motion only after five hours' exposure to the air. Those opened on the second day recovered after one hour, and those opened on the third day had already recovered. At the same time there were many dead mites present; but these were not necessarily killed by the spray, as there appear always to be a certain number of dead in the big buds.

### *Unstable Paraffin Emulsions.*

By keeping the amount of soft soap very small it is possible to obtain a paraffin emulsion that will remain long enough to admit of the ordinary spraying operations without much de-emulsification during the process. With the hard water of Long Ashton it was necessary to use about ·6 per cent. for 20 per cent. of paraffin, and about ·4 per cent. for 10 per cent. paraffin. Such emulsions, when they strike an object after being sprayed quickly, liberate a small quantity of pure paraffin. It was found possible, by the use of such emlusions, to get very good penetration into big buds, the penetration being secured by paraffin in this case, instead of by soft soap. The stronger emulsion was very successful, and caused almost 100 per cent. mortality among the mites. Such a drastic treatment might have been expected to cause extensive burning of the opening normal buds, but no such damage occurred.

In accordance with these results from laboratory experiments, the following mixtures were tried out of doors on badly attacked black currants, about the middle of March. At this time the normal buds were just showing green tips.

1. 10% Soft Soap
2. 10% ,, ,, +10% Paraffin in Emulsion.
3. ·4% ,, ,, +10% ,, in Unstable Emulsion.
4. ·6% ,, ,, +20% ,, ,, ,,
5. 10% ,, ,, +2% Oil of Mirbane in Emulsion.

After 10 days there was no sign of burning from any of these mixtures.

The results from these trials were disappointing. Nearly all the treated bushes showed an increase of big buds in the autumn of 1915. The only exception was in the case of two or three bushes that had been sprayed with 10 per cent. soft soap in December. These showed a very marked diminution in the number of affected buds.

For some unexplained reason penetration was more than usually effective, and at the time practically no eggs were present in the bud. In the case of the March sprayings alluded to above there were great numbers of eggs present that were probably unaffected thus producing mites for the migrating period even when the adults had been killed.

## WINTER TREATMENT OF MUSSEL SCALE.

The mussel scale, *Lepidosaphes ulmi*, is a common pest of the apple. It attacks many different trees, but apple is the usual host. It is difficult to calculate exactly how much damage it does. It has, however, clearly two injurious effects. First, it must cause considerable loss of sap to the tree. If a piece of scale covered bark be sliced tangentically so as to expose the cortical tissues, a great number of small circular brown marks are seen. The centre of each mark indicates the place where the sucking mouth parts of the insect have penetrated. From their great number it is clear that from a badly attacked tree a considerable quantity of liquid must be taken. It is difficult to say exactly where the sucking apparatus terminates. On the trunks of fair-sized standards it does not appear to reach the wood, and in these cases liquid is probably absorbed from the cortex and phloëm. If the phloëm is, indeed, attacked, and from the insect's point of view this tissue would undoubtedly provide the most nourishment, it can easily be seen that great damage might be done. The stream of elaborated food products going to the root would be greatly checked, and the roots starved in consequence.

The second clear source of damage is the injury to the bark. After some years it becomes rough and scurfy, and is obviously in an unhealthy condition. As a result the tree becomes bark bound. This condition is partially explained when the sliced-off piece of bark, above alluded to, is examined.

The injury due to the insertion ot the insect's mouth-parts is not confined to the cells immediately surrounding them, but spreads for some little distance around.

As a result, on a heavily attacked tree there is very little of the cortical tissues that remain uninjured. Bark formation is greatly interfered with, and instead of growing with the increasing size of the tree, it remains stationary, or almost so, until the expanding force is great enough to crack it.

The damage is, therefore, serious enough to warrant immediate treatment by the fruit grower.

In Professor Theobald's book on "Insect Pests and Fruit" an interesting account is given of various spray fluids tried both in summer and winter.

In conclusion, he recommends either a strong soap paraffin emulsion, or Woburn wash, but deprecates the use of caustic alkali fluids, "as undoubtedly harmful to the trees."

At Long Ashton three winter spray fluids were tried. They were as follows:—

Caustic Soda 2% (2lbs. per 10 gallons)
Paraffin Emulsion. (Paraffin 10%, Soft Soap 10%)
Lime Sulphur 1 gallon Commercial concentrate to 12 gallons water.

The high proportion of soap used in the paraffin emulsion was to ensure the utmost possible penetration under and into the scale. Laboratory experiments had shown that it possessed considerable penetration power.

The trees were examined in the early summer when it was found that the paraffin emulsion and a lime sulphur had failed to produce any obvious reduction in the amount of scale. The trees sprayed with caustic soda were, on the other hand, completely free from scale. They suffered no injury that could be ascertained. In view, however, of Theobald's experiments, where he reports of this wash that "the trees appeared cleaner, but in no case was any apparent damage done to the scales," it would be unwise to assume that caustic soda is successful under all conditions. It will be given further and more extensive trials at Long Ashton.

## FRIT-FLY EXPERIMENTS.

The frit-fly has existed in Wiltshire, as far as can be ascertained, at least five years. Some years the damage done is greater than in others, 1914 being a particularly bad year.

The experiments carried out this year were quite of a preliminary nature, and it is hoped that, with further knowledge of the pest, more useful recommendations will be possible.

There is a certain amount of information available in text books as to the life history of the insect, but many important details are not stated. It is often these small details that give a clue to some feasible method of control, so that, undoubtedly, before undertaking extensive experiments it is highly important to obtain as much information as possible in the field. With this end in view, five farms in the county were chosen, at which experiments could be done, if desirable, and where, at any rate, the life history of the insect could be followed. The farms were at Ashton Keynes, Broad Hinton, Aldbourne, Longbridge Deverill, and Dinton. Each place was visited twice during the summer—once in June and once in August—and useful information was obtained.

It would, perhaps, be well to point out here how difficult it is to control agricultural insect pests. Compared with a fruit orchard, the value of the crop is small and the expenses of control must always be limited by the net profits on the crop, except in cases where energetic measures will give immunity for some years. The wide acreage of agricultural crops also greatly increases the difficulty of obtaining labour for operations on a large scale. It is, therefore, necessary in most cases, to rely on suitable cultural operations for controlling agricultural insect pests. The life history of the frit-fly as stated in text books may be summarised thus:—The fly appears in May and lays its eggs on the young oat leaf. The egg hatches and the escaping maggot bores its way into the growing point of the oat. Towards the end of June it enters the puparium stage, that is, it forms a cocoon where it rests till the middle of July. It then emerges as a small fly similar to the one appearing in May. Instead, however, of laying its egg on the leaf, it lays it on, or in the developing grain of, the ear. Here the larva of the second generation feeds until August, when it changes after a cocoon stage into the fly again. This fly is said to lay its eggs on wild grasses, and the resulting larva there exists through the winter. In the spring, after the third cocoon stage in its life history, it comes out as the perfect fly, which attacks the oat in May.

Such being the accepted life history it was thought that it might be possible to prevent egg laying by a suitable deterrent. Crude naphthalene was the substance used, and sufficient quantities were sent to the five centres. It was applied to the ground in the early part of May, just when the fly should be appearing. The smell of naphthalene is objectionable to most insects, but in this case it exerted no beneficial effect.

Where any quantity of rain occurred within two days, the oats were damaged rather badly. Where, however, it did not occur until a week after application, the damage was hardly perceptible, and, in one case, a considerable stimulating effect on the clover underneath was observed. This was probably due to the partial sterilization of the soil, a subject recently worked out by Dr. Russell, of Rothamstead. This first experiment was, therefore, a failure, but the farms were visited with a view of gaining further information. In addition, forms were sent out by the Secretary from the County Offices requesting certain information, and a considerable number of answers were obtained. Summarising these answers the following points became clear: (1) winter oats are never attacked, (2) early spring oats usually succeed better than late ones, and (3) no variety is immune. These points were brought out also at my visits, and showed that at the five centres winter oats were always immune.

Spring sown oats may be divided into those planted early, in mid-season, and late. These terms are purposely made vague, as what is early for a late farm, may be late for an early farm. Each farmer would have his own date to assign to these terms, depending on the site of his farm and the character of the season.

In nearly every case visited the early sown oats were less affected than the later sown. In one case, however, a late sown piece, planted probably about the beginning of May, escaped, while a piece on the same farm, planted at the beginning of March, was rather badly attacked.

At the time of my second visit to these farms, in August, all the oats under observation, had very much improved. This was probably due to the heavy rains early in July; at the time of their occurrence the second generation of the fly was appearing, and no doubt many flies were thus destroyed. At the same time the oat plant was stimulated in growth. The combined result was that the crop, which in many cases was badly affected, recovered partially, and a better harvest was obtained than was expected.

The damage done by the fly is two-fold. The first generation attacking the growing point of the oat causes the plant to tiller. These side shoots, if not interfered with, do not ripen enough by harvest time to produce full-sized grains, but only light ones. As a rule, however, the second generation of the fly causes still more damage by attacking the developing grains, which are completely eaten out. The fly, which develops from the grain, which is the third time the pest appears in the fly stage during the year, begins to appear soon after the crop is cut, and before it is carted. Probably most of them come out during the time the oat is in the stack, but flies are known to appear right into the late winter. The methods of control that this life history allows are not many.

Where winter oats can be planted this should be done, and failing that, planting should take place as early as possible. This still leaves cases where neither of these procedures can be carried out. Nothing can be recommended for these cases at present.

### WINTER COVER WASHES.

Winter cover washes, or more properly late spring cover washes, were first tried on the large scale by Mr. Howard Chapman, of Kent.

He found by experience that a lime wash applied as late as possible before the buds burst in spring produced a very decided lessening of Psylla attack, and consequent increase of crop. Cover washes have also certain other subsidiary, but very real advantages:—

(1) They can be applied when labour is easily obtainable. A summer wash has to be put on at the end of April, nearly two months later, when labour is urgently needed for other operations.

(2) They tend to keep the bark clean.

(3) They add a small amount of lime or chalk to the soil.

Since its introduction lime wash has been tried by many growers, some of whom have become enthusiastic advocates of it, while in the hands of others it has produced no apparent good. It seemed, therefore, desirable to make some investigation into its action. Two hypotheses were current to account for its good action, since undoubtedly it has had good action in some places and under some conditions. The first suggested that its action was due to the causticity of the hot lime, which had some effect on the protoplasm inside the egg, or at any rate, so influenced the egg shell as to render the ovum fatally susceptible to outside conditions. The second supposed that the lime covering had no direct action but only an indirect mechanical one, effectually sealing in the eggs and preventing the hatching of the enclosed larva. It was obvious from the outset that the first explanation was unlikely. When one considers that the chitin of insect eggs can resist being boiled in strong caustic soda, it is not likely that the feebly caustic lime would affect it. The second thus appeared a more likely hypothesis. Working on this it is at once apparent that to make such a wash most efficient certain conditions must be fulfilled. These are:—

(1) It must give a thick covering.

(2) It must resist all external conditions causing lessening of the coat when once on the tree, *i.e.*, it should not flake when dry or wash away when wetted by rain.

(3) It should be applied as late in the spring as possible.

(4) The materials should be reasonably cheap and easy to get.

(5) It should be easily made.

The ordinary mixture of lime and salt, or lime alone, though fulfilling most of these conditions, suffers badly through erosive action of weather. The experiments, of which here a summary only is given, were started with a view to find some mixture that would resist weather conditions. They were begun in the autumn of 1912, and concluded in the spring of 1915, work being naturally confined to the dormant season in each year.

The method adopted was to test mixtures at first under laboratory conditions, and afterwards to give more extensive trials on a large scale to the promising ones.

During the season 1912–13 the following mixtures were tried both on the small and large scale :—

Lime alone.
Lime and salt.
Lime and tallow.
Lime and waterglass.
Whiting and size.

The lime mixtures showed no improvement in adhesive power on lime alone, and there is certainly no advantage in including them when doing practical lime spraying.

A mixture of whiting and size was found to have excellent sticking properties, but was prohibitive in cost and a nuisance to make. During the season 1913–14, therefore, attempts were made to bring down the cost.

A substitute for size was found in hide glue, which cost 4½d. a lb., instead of 1s. The cost, however, which worked out to 5d. per gallon was still prohibitive, and efforts were made to find some body that could be substituted for part of the glue while still retaining in the mixture its covering and adhesive power. Ordinary flour proving unsuitable, starch was tried, and by means of a cheap form of potato starch, a mixture having good covering power, but only moderate adhesiveness, was obtained for 2d. per gallon.

The addition of a small quantity of potassium dichromate greatly improved the adhesiveness.

The action of this salt on gelatine is made use of in photography. When gelatine mixed with a small amount is exposed to light it becomes insoluble in water. Gelatine is the basis of glue, so that it is possible to make use of this effect with advantage. If in small enough quantities, the dichromate does not affect the covering power of the mixture, but if too much is added a loss of covering power at once occurs.

The best formula was :—

Whiting, 8lbs.
Glue, ⅛lb.
Starch, ¼lb.
Potassium dichromate, 1-64th lb.
Water, 10 gallons.

This formula involved the use of hot water to get the starch and glue into solution. Once made, however, it was easy to apply. When on the tree a large surface was exposed to the action of light, and the glue was thus rendered insoluble as the mixture dried. It showed a marked increase of resistance to weather, compared with ordinary lime wash. The use of whiting, instead of lime, was necessitated by the fact that milk of lime, prepared in the ordinary way, had a chemical action on glue causing it to become immediately insoluble in water. This resulted in a loss of covering power. In this mixture, which cost 2d. a gallon, the whiting accounted for 1¼d. It seemed desirable, therefore, to experiment further with lime mixtures since lime, for its covering power, is nearly five times as cheap as whiting.

The use of aluminium salts offered a possible solution. When alum or aluminium sulphate is added to milk of lime aluminium hydroxide is precipitated. This substance is very bulky and gelatinous, and considerably increases the covering power of a mixture which contains it. It gave good results in the laboratory, but when used outside had a fatal tendency to flake off, which rendered its use undesirable. A considerable number of other substances were added to the ordinary lime wash under laboratory conditions.

These included calcium chloride, solar distillate, skim milk, cement, plaster of Paris, iron sulphate, and cressyllic acid.

Fuller details may be found in the author's paper on "Winter Cover Washes," published in the "Annals of Applied Biology," Vol. I, Nos. 3 and 4.

Many of these mixtures were tried on the large scale, but none of them gave such good results as the whiting formula, which was the best produced up to the end of the Spring of 1914. In carrying on these experiments it was necessary to determine what methods of slaking lime gave the best coat when used by itself. It was found that while hot water gave the thickest coat the firmest was obtained by using cold water and allowing the mixture to stand for 12 hours before use. When, therefore, lime spraying is done without addition of any other substance it is strongly urged, if possible, to allow the mixture to stand over-night before application. This can be effected with economy in tubs used by adding only one-third of the total quantity of water required, and diluting immediately prior to application. By this means one 40-gallon tub will hold enough for 120 gallons of wash. To decide in what way lime wash was effective in combating apple sucker, twigs on which eggs had been laid were coated and kept in the laboratory. When the controls had hatched the lime was carefully dissolved off the treated twigs. It was then found that in most cases the egg-shell had split, but the larva had failed to get out. In other cases the larva had succeeded in getting out, but was held imprisoned in the lime coat. Only a few succeeded in reaching a bud. It follows, therefore, that the action of the lime is mechanical, and the more resistant it can be made to rain and other adverse influences the more successful it will be.

In the autumn of 1914 further attempts were made to find an adhesive mixture. It is hoped to publish a further paper on the results so that they are only given here in brief.

It was felt absolutely necessary, after experience, in the field, to find a mixture that could be made without hot water, and at the same time not costing more than about 1d. per gallon.

The following substances were tried :—

Lime and starch.
,, ,, casein.
,, ,, resin.
,, ,, watery extract of dung.
,, ,, paper pulp.
,, ,, ,, ,, and starch.
,, ,, boiled linseed oil.

The substances were added in varying quantities, and often in different ways, and under different conditions, but though some were superior to lime alone none showed a superiority commensurate with the increased cost.

Glue is supposed to be insoluble in alkalies, but it was thought advisable to investigate the action of alkalies on its solutions. On this being done it was found that cold lime water added to cold glue solution produced no insoluble precipitate for several hours. Even so strong an alkali as 10 per cent. caustic soda, had no immediate action if added quite cold. Milk of lime was also without immediate action if quite cold, and completely slaked. Both these conditions must be fulfilled or the glue is rendered insoluble.

Accordingly mixtures of cold slaked lime and glue were made up which proved decidedly superior to lime alone, though the mixture under any other conditions was greatly inferior to lime alone. It was soon found, however, that these mixtures dried, when put on a tree, before the feeble alkali had had time to act on the glue to render it insoluble. It was, of course, desired so to regulate the mixture that though the glue should be in solution before being applied it should become insoluble before the mixture had completely dried on the tree. It was found that the most reliable way to obtain the desired conditions was to use the lime thoroughly slaked and cold, and then to add a small quantity of potassium dichromate immediately before application. By this means a hard gritty coat was obtained that was very resistant to rain. The second way was to add the glue to the lime mixture when this was still warm, that is at about body temperature. This often produced most remarkable resistant coats (owing to part of the glue being made insoluble), but was a somewhat unreliable method as a slightly too great temperature of the lime would have a too drastic action, thus rendering the glue insoluble too soon.

The formula for the dichromate mixture is :—

Lime, 30lbs.
Glue, 2lbs.
Potassium dichromate, ⅜oz.
Water, 10 gallons.

It is necessary to use more lime than usual, as the glue has a physical action on the liquid, causing it to have greater spreading powers. A gallon of the liquid has, however, greater covering powers than ordinary lime wash of the 2lbs. to a gallon formula, so that this does not mean that more lime is used to spray a given area. The cost of the mixture is about 1¼d. per gallon. The glue can be dissolved in a separate vessel by standing the latter in the hot slaking lime.

## THE WASTE FROM SAW-MILLS AS A SOURCE OF POTASH.

Since the outbreak of war, various methods have been suggested for making up, to some extent at least, the deficiency in our supplies of potash manures caused by the cessation of the imports from Germany. A recent article by Dr. E. J. Russell* on the value of the ashes of hedge-clippings and trimmings as a source of potash, may be referred to in this connection, and also the work of the Forestry Department of the West of Scotland Agricultural College,† " the results of which indicate that there is a commercial possibility for the production of potash salts on a considerable scale from forest produce."

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* "Journal Board of Agriculture," Vol. XXI., No. 8, Nov., 1914.

† See Leaflet No. 25, " Board of Agriculture for Scotland" ; also G. P. Gordon, " Trans. Royal Scottish Arboricultural Society," Jan., 1915.

In addition to the potash obtainable from these sources there is a very large amount, of which at present little use is made, in the wood scraps, saw-dust, shavings from planing machines, etc., produced in enormous quantities in every saw-mill in the country. Is it not possible to avail ourselves of this source of supply ? All that is required is a satisfactory and cheap means of burning the material, and proper methods of collecting, mixing, and disposing of the ash produced. It is true that some of the wood-waste, in particular the saw-dust, is saleable as such in certain localities, and in limited amounts, and it is also true that the percentage of ash in the shavings and saw-dust, especially from some of the imported timbers, is very small. But even when allowance is made for both these considerations, it remains a notable fact that there are very large quantities of waste wood available for conversion into ash.

In many saw-mills the wood-waste is already used as fuel for raising steam or for other purposes, and wood-ash is then a normal product. On the other hand, when the arrangements are not adapted for burning wood, the great piles of saw-dust and wood shavings are often a serious source of embarrassment, and in busy times the rapid removal of such bulky material may be a matter of some difficulty.

For our present purpose, we may divide saw-mills into three classes :—

(1) Those using wood only as fuel.

(2) Those using wood mixed with coal as fuel.

(3) Those disposing of their waste wood otherwise than as fuel.

1.—*Mills Burning Wood only.*—In most mills coming under this head, the ash obtained either accumulates in a heap and incidentally loses nearly all its potash by exposure to rain, or it is given away to whoever will take it. In some few cases it is sold to a neighbouring farmer at a nominal price.

Two types of ash may be distinguished—(1) a comparatively coarse material obtained by burning the wood-waste in open furnaces or in some types of gas producing plants, etc., and (2) a very fine powder or flue-dust obtained from boiler-flues and chimneys. The latter material is the more valuable, sometimes containing as much as 9 or 10 per cent. of potash, then constituting a manure of almost the same value as kainit* ; it is always obtained perfectly dry, and is in a beautifully fine mechanical condition. A number of samples of both types of ash have been examined, and a few figures are given :

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* Wood-ash also always contains a small percentage of phosphates which add slightly to the manurial value.

| Sample | No. | | | Potash Per cent. K 0 |
|---|---|---|---|---|
| Sample | No. 4 | Coarse Ash : | very complete combustion | 7·24 |
| ,, | ,, 5 | ,, ,, | | 5·08 |
| ,, | ,, 6 | Flue-dust | | 9·11 |
| ,, | ,, 8 | ,, ,, | | 6·35 |
| ,, | ,, 9 | ,, ,, | coarser than Nos. 6 and 8 | 5·89 |

At present the fact that the ash or flue-dust contains potash, and has therefore a definite manurial value, is often not realised, and no attempt is made to store it properly. The collection in quantity of such ash as is already produced does, it is true, present some difficulty, because the numerous smaller saw-mills turning out perhaps not more than 8 or 10 tons of ash a year are scattered all about the country.* The most promising plan would therefore seem to be to attempt to bring to the notice of both farmers and timber merchants in their respective localities the possibility of utilising wood ashes in place of kainit where potash manuring is contemplated. At the same time, if even a small general demand sprang up, and the collection of the material could be satisfactorily organised, a considerable trade could probably be done.

2.—*Mills Burning a Mixture of Wood and Coal.*—From the fertiliser point of view the addition of coal ashes to the wood-ash is a very serious disadvantage, and the use of such a mixture cannot be recommended. If, however, the ash were a saleable commodity, there are many saw-mills where it would be quite possible to increase the use of wood, thus increasing the output of pure wood ash.

3.—*Mills which do not employ Wood as Fuel.*—It has been already mentioned that in saw-mills where the waste is not burned it often accumulates to such an extent as to become a nuisance. If there were any sort of demand for wood-ash, local or general, a large number of firms who do not now burn their waste would find it worth while installing plants adapted to use wood as fuel. Moreover, in big towns, where there are many large saw-mills turning out hundreds of tons of wood-waste every week, it might very well pay to set up special plant for burning the waste for the express purpose of ash production.

The matter can, perhaps, be summed up by saying that an increased demand for wood-ash, even though the price were low could be met by an increased supply.

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* This is especially the case with the majority of English timber mills, and these are of particular interest because the ash from English timber waste is usually richer in potash than that from imported timber waste.

With regard to the value of wood-ash and flue-dust from saw-mill furnaces, it is important to remember that since timber is relatively poorer in potash than leaves, bark, twigs, etc., the material will in the great majority of cases contain less potash than similar ash obtained by burning the undergrowth and waste of forest and woodland. It will, therefore, constitute a somewhat lower grade and cheaper fertiliser. On the basis of the pre-war price of kainit, ashes such as those of which the analyses are given, should be worth anything from 25s. to 50s. per ton ; and since ash is almost purely a waste product, there is good reason to suppose that it could compete with kainit even in normal times.

The special suitability of wood-ash as a source of potash for plants is well-known. It may, however, be useful to emphasize two points. In the first place, the potash in wood-ash is present for the most part as potassium carbonate, a salt very easily soluble in water. This is an advantage from the fertiliser point of view, since it means that all the potash is readily available for the plant; but it necessitates care being taken that the material shall not get wet by exposure to rain. The action of rain in washing out the potash is surprisingly rapid and complete ; examples of this are given by Dr. Russell in the article previously referred to.

Finally, an important point is the necessity that will arise for very thorough mixing of any bulk of wood-ash on account of the considerable variations in the percentage of potash in different lots. For marketing, every consignment would have to be sold on its analysis ; and would therefore have to be uniform in composition throughout.

Enough has, perhaps, been said to indicate that the possibility of the utilisation of waste wood from saw-mills as a source of potash is at least worthy of consideration. There would appear to be available a useful supply of " home-produced " potash fertiliser.

## A REPORT ON THE COMPOSITION OF MANGELS GROWN IN THE PROVINCIAL COUNCIL (BRISTOL PROVINCE) MANGEL VARIETY TRIALS, 1915.*

At the request of the Sub-Committee on Joint Field Demonstrations, analyses were made of samples of the mangels grown in these trials. The number of centres at which plots were laid out was eight : two in each of the counties of Gloucester, Hereford, Somerset, and Worcester. At each centre the following six varieties were grown:—Garton's Golden Globe, Sutton's Golden Tankard, Garton's Red Globe, Webbs' Red Intermediate, Webbs' Lion Intermediate, and Sutton's Prizewinner. Samples were taken from each plot at each centre, and determinations of dry matter and of sugar were made on all the samples. The Agricultural Organisers of the respective counties undertook the field work in connection with the trials.

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*A leaflet summarizing the results of these trials is obtainable on application to the Secretary, University of Bristol Agricultural and Horticultural Research Station, Long Ashton, Bristol.

With slight modifications, the methods adopted both for sampling and making the determinations were those recommended by Wood and Berry in their work on " Variation in the Chemical Composition of Mangels " (*Journal of Agricultural Science*, Vol. I., p. 176). The samples were obtained by means of specially made corers, cores being taken from 50 roots in each plot in order to obviate the error due to variation in individual composition which would be almost certain to arise if only a small number of roots is sampled. Wood and Berry found that by taking 50 roots the error in the determinations was reduced to ± 0·2 per cent. or under. The cores were taken horizontally through the greatest diameter of the root which is " the region where variation in composition is least pronounced." The bundles of 50 cores from each plot were wrapped in butter paper, and conveyed to the laboratory in air-tight tin boxes. In all cases (except the samples from Herefordshire) the determinations were made on the day following sampling.

For analysis the cores were cut in half, half being used for the estimation of dry matter and half for the estimation of sugar.

*Dry Matter.*—The samples were weighed on aluminium plates, and dried for 10-14 days on hot water pipes at a temperature of about 50°C., the drying being finally completed by two days in an oven at about 60°C. No charring whatever was observed.

*Sugar.*—The samples were ground in a sausage mill and then pressed to obtain the juice. The requisite quantity of juice was measured (after skimming off the froth), clarified with basic lead acetate and filtered. The filtrate was then polarised both before and after inversion, and the precentage of total sugar calculated from the rotations observed. The percentage of sugar in the juice was converted into percentage in the root by the use of the factor 0·93 (Wood and Berry). It may be of interest to note here that the clarified juice of the two yellow-fleshed varieties—Sutton's Golden Tankard and Garton's Golden Globe—was of a clear golden-yellow colour, whilst in the case of the two red varieties it was colourless, the pigment having been precipitated by the basic lead acetate. This precipitation of pigment was observed by Wood and Berry in the case of all " Long Red " mangels.

TABLE I.

| | Yield. Tons per acre. | % Dry matter | % Sugar |
|---|---|---|---|
| GARTON'S GOLDEN GLOBE. | | | |
| Winchcombe, Gloucestershire | 41·06 | 12·01 | 7·61 |
| Tibberton, Gloucestershire | 35·0 | 13·44 | 8·98 |
| Webton Court, Herefordshire | 26·9 | 11·19 | 6·1 |
| Chipp's House, Herefordshire | 23·5 | 12·74 | 7·08 |
| Chisleborough, Somerset | 32·0 | 11·98 | 7·33 |
| Hambridge, Somerset | 27·5 | 11·47 | 7·15 |
| Malvern Wells, Worcestershire | 27·5 | 13·47 | 8·3 |
| Stockton, Worcestershire | 29·95 | 11·19 | 6·94 |
| **Average (8 centres)** | **30·4** | **12·19** | **7·44** |
| SUTTON'S GOLDEN TANKARD. | | | |
| Winchcombe, Gloucestershire | 43·5 | 13·02 | 8·26 |
| Tibberton, Gloucestershire | 36·65 | 13·03 | 8·21 |
| Webton Court, Herefordshire | 25·8 | 12·11 | 5·60 |
| Chipp's House, Herefordshire | 33·15 | 11·53 | 6·39 |
| Chisleborough, Somerset | 27·71 | 11·58 | 6·74 |
| Hambridge, Somerset | 22·62 | 13·0 | 7·35 |
| Malvern Wells, Worcestershire | 26·55 | 12·44 | 7·74 |
| Stockton, Worcestershire | 34·45 | 10·19 | 5·76 |
| **Average (8 centres)** | **31·3** | **12·1** | **7·01** |
| GARTON'S RED GLOBE. | | | |
| Winchcombe, Gloucestershire | 50·35 | 9·76 | 5·6 |
| Tibberton, Gloucestershire | 49·8 | 12·12 | 8·03 |
| Webton Court, Herefordshire | 36·65 | 10·66 | 5·2 |
| Chipp's House, Herefordshire | 33·55 | 10·83 | 6·13 |
| Chisleborough, Somerset | 40·35 | 10·55 | 6·42 |
| Hambridge, Somerset | 26·5 | 11·62 | 6·96 |
| Malvern Wells, Worcestershire | 29·5 | 12·61 | 7·79 |
| Stockton, Worcestershire | 37·65 | 9·82 | 5·91 |
| **Average (8 centres)** | **38·2** | **10·99** | **6·51** |
| WEBBS' RED INTERMEDIATE. | | | |
| Winchcombe, Gloucestershire | 48·5 | 10·03 | 5·33 |
| Tibberton, Gloucestershire | 42·0 | 11·98 | 7·74 |
| Webton Court, Herefordshire | 40·15 | 9·57 | 5·22 |
| Chipp's House, Herefordshire | 40·85 | 10·38 | 5·93 |
| Chisleborough, Somerset | 51·15 | 10·13 | 5·74 |
| Hambridge, Somerset | 32·71 | 10·34 | 5·83 |
| Malvern Wells, Worcestershire | 29·20 | 11·6 | 6·67 |
| Stockton, Worcestershire | 34·65 | 9·0 | 5·36 |
| **Average (8 centres)** | **39·9** | **10·38** | **5·98** |
| WEBBS' LION INTERMEDIATE. | | | |
| Winchcombe, Gloucestershire | 50·0 | 9·37 | 5·13 |
| Tibberton, Gloucestershire | 44·56 | 11·95 | 7·5 |
| Webton Court, Herefordshire | 39·40 | 10·31 | 5·02 |
| Chipp's House, Herefordshire | 38·90 | 9·43 | 5·26 |
| Chisleborough, Somerset | 41·21 | 9·91 | 5·5 |
| Hambridge, Somerset | 27·0 | 10·34 | 5·93 |
| Malvern Wells, Worcestershire | 30·5 | 11·83 | 6·73 |

TABLE I.—*continued.*

| | Yield. Tons per acre. | % Dry Matter | % Sugar. |
|---|---|---|---|
| WEBBS' LION INTERMEDIATE—*continued* | | | |
| Stockton, Worcestershire .. .. | 35·3 | 8·88 | 5·04 |
| **Average (8 centres)** .. .. .. | **38·4** | **10·25** | **5·78** |
| SUTTON'S PRIZEWINNER. | | | |
| Winchcombe, Gloucester .. .. | 46·4 | 9·25 | 4·76 |
| Tibberton, Gloucestershire .. .. | 45·92 | 11·66 | 7·47 |
| Webton Court, Herefordshire .. | 37·10 | 9·41 | 3·98 |
| Chipp's House, Herefordshire .. | 37·0 | 10·03 | 5·29 |
| Chisleborough, Somerset .. .. | 38·35 | 9·57 | 5·2 |
| Hambridge, Somerset .. .. | 34·1 | 9·5 | 5·44 |
| Malvern Wells, Worcestershire .. | 28·15 | 9·89 | 5·17 |
| Stockton, Worcestershire .. .. | 34·75 | 9·13 | 4·97 |
| **Average (8 centres)** .. .. .. | **37·7** | **9·8** | **5·28** |

The analytical figures and the yields are given in Table I. The varieties are there placed in order of merit, so far as average *quality* is concerned, the same order applying to the percentages of both dry matter and sugar. As is always the case in experiments of this kind, there is considerable variation in the composition of the same variety at different centres, due probably to differences in soil, manuring, cultivation, etc. Nevertheless, in every case the six varieties are found to divide themselves into two distinct groups. At each centre the first three—Garton's Golden Globe, Sutton's Golden Tankard, and Garton's Red Globe—have given crops of very distinctly higher quality than the last three. If we take the two extremes—Garton's Golden Globe and Sutton's Prize winner—the average difference in dry matter amounts to nearly 2½ per cent., which means that a 40-ton crop of the former provides as much food as a 50-ton crop of the latter.

From the practical point of view, however, the matter of special importance is not, which is the variety of highest food value, but which variety yields the greatest amount of *food per acre* ? Some figures giving information with regard to this are given in Tables II. and III. In Table II. the weight of dry matter produced per acre is calculated for each variety at each centre , whilst Table III. summarizes these results. and in the second and third columns gives the average figures for the production of dry matter and of sugar at all the centres.

It will be seen at once that the two varieties of highest quality give the poorest crop, with the result that the average production of

TABLE II.

DRY MATTER PER ACRE IN TONS.

| Centre. | Variety. | | | | | |
|---|---|---|---|---|---|---|
| | Garton's Golden Globe. | Sutton's Golden Tankard. | Garton's Red Globe. | Webbs' Red Intermediate. | Webbs' Lion Intermediate. | Sutton's Prize Winner. |
| Tibberton, Glos. .. | 4·70 | 4·77 | 6·04 | 5·03 | 5·33 | 5·36 |
| Winchcombe, Glos. .. | 4·93 | 5·66 | 4·91 | 4·86 | 4·68 | 4·29 |
| Webton Court, Hereford. | 3·00 | 3·12 | 3·90 | 3·84 | 4·06 | 3·49 |
| Chipp's House, Hereford. | 2·99 | 3·82 | 3·63 | 4·24 | 3·67 | 3·71 |
| Chisleborough, Som. .. | 3·83 | 3·21 | 4·26 | 5·18 | 4·08 | 3·67 |
| Hambridge, Som. .. | 3·15 | 2·94 | 3·08 | 3·38 | 2·79 | 3·24 |
| Malvern Wells, Worcs. | 3·7 | 3·30 | 3·72 | 3·39 | 3·61 | 2·78 |
| Stockton, Worcs. .. | 3·34 | 3·51 | 3·70 | 3·12 | 3·13 | 3·17 |

TABLE III.

| Variety. | Average yield tons per acre. | Average Dry Matter per acre. Tons. | Average Sugar per acre. Tons. |
|---|---|---|---|
| Garton's Golden Globe .. | 30·4 | 3·7 | 2·3 |
| Sutton's Golden Tankard .. | 31·3 | 3·8 | 2·2 |
| Garton's Red Globe .. .. | 38·2 | 4·2 | 2·5 |
| Webbs' Red Intermediate .. | 39·9 | 4·1 | 2·4 |
| Webbs' Lion Intermediate .. | 38·4 | 3·9 | 2·2 |
| Sutton's Prizewinner .. | 37·7 | 3·7 | 2·0 |

dry matter and of sugar per acre is low. On the other hand, the variety of poorest quality—Sutton's Prizewinner—has not, in these experiments, made up for its low feeding value by giving the biggest crop, and the average amount of dry matter per acre is the same as with Garton's Golden Globe, whilst the sugar is lower. Intermediate come the two red mangels (Garton's Red Globe and Webbs' Red Intermediate) and Webbs' Lion Intermediate, with good cropping power, and of very fair quality.

As a general result, these three have undoubtedly, proved themselves in these trials, the best varieties to grow in order to obtain the highest yield of food per acre. There is not a great deal to choose between them, the order in which they come varying at the different centres, and as the results refer to one season only, the small differences in the average figures are probably not significant.

With regard to the details at the individual centres, if Table II. is examined, it will be seen that the most serious divergence from the order in which the average figures come is shown at the Winchcombe centre. Here the varieties of high quality yielded unusually well, and give the bighest production of dry matter per acre. This is probably to be explained by the fact that at this centre a very large dressing of nitrate of soda was given in addition to heavy dunging, and has evidently had great effect in increasing the cropping power of the better quality varieties. With this exception the divergencies from the general order are not very great.

In view of the high production of dry matter shown by the two red varieties in these trials, it is interesting to find that, in the extensive investigations of Wood and Berry, in the Eastern counties, "Long Red" strains gave the highest yields of dry matter per acre. Whether the red varieties grown in these trials are related to "Long Reds" it is difficult to say, but the non-precipitation of the pigment by lead acetate, as noted above, may possibly indicate some connection.

A general comparison of the same varieties in the two sets of experiments shows on the whole rather poorer quality, but somewhat bigger crops for roots grown in the South-west counties. No doubt this is connected with the general difference in rainfall.

# The Note-Book.

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**Live Stock in War Time and After.**—The prolongation of the great European war, and the realisation of the immense task that is involved in subduing the vast military organisation which has been carefully built up for generations, make it more important than ever that British agriculture, and especially the live stock branch of the industry, should perform its due share in the arduous work that lies before the nation. It is necessary not only that our matchless breeds of live stock should be maintained for the benefit of the world, but that the numbers should, if possible, be increased, and that the best results should be secured in the production of food.

What is wanted with respect to light horse breeding is an improved market, and if remunerative prices were offered farmers would doubtless extend the breeding of light horses, aiming at the production of the very best class, and in that way furnishing an additional supply for Army purposes ; but it cannot be expected that this will be undertaken by men farming for a living unless it is rendered fairly profitable.

The influence of the war on land and live stock has confirmed the experiences of former great campaigns, for it has quickened demand and hardened prices, and, incidentally at this time, made some beneficial adjustments, where, in the world-wide competition which British farming had to meet, prices had been unduly reduced until the margin of profit had well-nigh disappeared. After a year of war it will be generally admitted that the trade for practically all classes of live stock has been much better than could have been anticipated. There has been a brisk and growing demand, and that at enhanced prices, yielding a fair margin of profit. A notable feature of the period has been the trade in pure-bred stock, as mirrored in the public and private sales which have taken place.

With the South American demand, the growing cry for fresh blood from U.S.A., and the great quantities of meat procured from abroad for war rations, which will entail a corresponding call for breeding stock for grading-up purposes, our British breeds will continue to be in great and increasing demand abroad and in the Colonies ; while it needs no spirit of prophecy to predict that the close of the war will see one of the greatest booms in pure-bred stock that has ever been experienced in this country. Breeders will, therefore, do well to so increase their stocks as to be ready to meet the call when it comes.

There is every reason to believe that the trade for commercial stock will also be well maintained, and that at profitable rates. The order respecting the slaughter of calves should also be helpful in increasing supplies. Meat and milk requirements are increasing, and the war has helped to equalise some of the growing disadvantages in the way of low prices, from which the producers have undeniably suffered.

With so many men taken from the land by the war, including experts in breeding and feeding, and many members of the veterinary profession, it is more than ever necessary that careful attention should be given to the health and well-being of stock, as it is only by maintaining animals in a thoroughly healthy condition that the best and most profitable results can be secured. This will be particularly necessary when climatic conditions, coupled with the necessary changes in rations, tend to produce ailments which a little foresight might have prevented. If disease is combated in its early stages it can more easily be dealt with, whereas if neglected the delay will certainly lead to further expense and trouble, and in many instances to the loss of valuable animals. The landed industry has already rendered magnificent service to the country in the large number of men it has contributed to His Majesty's Forces. Those who must remain at home will render no less valuable aid by helping to maintain and increase the yield from the land and from our farm live stock.

The Agricultural Returns for the United Kingdom, as collected in June, 1915, showed that there were of horses a total of 1,699,640, a decrease of 142,920 ; of cattle, 12,131,370, a decrease of 13,190 ; sheep, 28,181,540, an increase of 295,450 ; and pigs, 3,783,780, a decrease of 156,110.

As regards horses, the decrease, which has been in progress for some years owing to the increasing encroachments of motor traction, is not greater than might have been expected in view of the great demand for the war. Trench warfare has not involved the use of cavalry to a large extent ; but many horses have been employed for other purposes. In a paper read early in the year by Sir Alfred Pease, he emphasised a remark in last year's Almanac, when he stated that this war had developed a new demand from the Army for heavy draught horses, and big prices, £60 to over £80, were given for these horses. "I am told," he added, "that when all else stuck fast in the winter's mud in Flanders and in France our Allies beheld with amazement and admiration teams of British

Shire horses pulling steadily on through mud and sodden ground quite undefeated. The heavy draught horse can be left to take care of itself. I have no fear for the future as regards the supply of these."

It is satisfactory, especially from the horse-breeder's point of view, that the great breed shows have been continued.

Cattle increased in number in England and Wales, but decreased in Ireland, so that the figures for the United Kingdom are slightly less on the year. Still, the number is satisfactory, and the prices for good animals of all breeds have been excellent, in some cases establishing records. The decline in the number of cows, which decreased by 100,380, is, however, disappointing, especially as diminished labour and high prices for feeding-stuffs tend to cause a reduction in the number of cows kept for the production of milk for sale.

The increase in the number of sheep is the best feature of the returns, and shows that the ill-effects of the drought of 1913 are now being overcome, while the high prices of wool and mutton are encouraging farmers to resume breeding flocks which were abandoned owing to stress of circumstances.

In 1914 there was a large increase in the number of pigs; but in 1915 the numbers decreased, partly from the fact that prices tempted realisation, and also because high rates for feeding-stuffs always discourage pig-breeding. Now that pork, bacon, and hams are so dear, it is hoped that the industry will again revive.

In the various branches of stock-breeding the aim of all will doubtless be to help to the utmost increased production from studs, herds, and flocks. Not only do the requirements of the country in the serious struggle in which it is engaged demand this, but prices are encouraging to breeders and feeders, and it is most essential that the output of all kinds of stock and produce should be increased so as to reduce the amount of money sent abroad.—*Live Stock Journal Almanac.*

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The foregoing extracts are taken from one of the last articles written by the late Mr. James Sinclair, who died suddenly on November 5th, 1915, after having been Editor of the *Live Stock Journal* and its associated publications for a period of thirty years. One of the kindliest of men, and of a modest, unassuming disposition, his death will be mourned by a very wide circle of friends, not only for the qualities which endeared him to those who had the privilege of his friendship, but also for the great national service he rendered to the development and improvement of live stock in this and other lands. An indefatigable worker, Mr. Sinclair was the author and editor of many important volumes, chiefly devoted to live stock. His most notable book was unquestionably "The History of Shorthorn Cattle," which is recognised as the standard work on the breed.

**Sterility in Farm Animals.**—Readers in the habit of perusing veterinary queries and replies must be struck with the frequent demand for a remedy for cows and sows which either do not show the usual signs of œstrum or fail to stand to service. It is, of course, a very serious matter, and one is not surprised that so many sign themselves " Anxious."

It is a lamentable fact that sterility is steadily on the increase, and mostly so in pedigree stock of all species. What were known as shy breeders were observed in Elizabethan times and Shakespeare notes that " the vilest things do fastest propagate." If we are correct in saying that pedigree pigs, for instance, are less likely to breed, or more likely to go barren after a small litter, ought we to advise the small holder and the man who farms on a narrow margin of capital to avoid pedigrees and go in for common stock ? This advice, if acted upon, would hinder the grading up which, on the whole, has been going on well for a century, and those of us who have lived half that time can see a wonderful improvement on the long-legged scavengers that too often wasted time and food in the sty. A safer plan for the man who is haunted with rent audits is to refresh his stock with strains of the pure breeds which have shown superiority in early maturity and development of the more valuable parts of the carcass by a smaller expenditure of food, while keeping in the main to the recognised prolific stock of his district.

In order to understand sterility, one should have a general outline knowledge of the anatomy of the organs concerned. It should be recognised by all that reproduction, whether in a beautiful flower or an ungainly pig, must be the result of impregnation by the germs of the male acting on those of the female. Sterility, then, may be the fault of the male or the female. If either cows or sows have proved pregnant to a particular bull or boar, he is not likely to be the cause of disappointment when a female proves "empty," as we call it. The semen of faulty males can be collected and if the number or proportion of spermatozoa, or their entire absence, or their feeble behaviour or virility, as the case may be, are noted, it is not difficult for an expert in this kind of examination to form a fair estimate of the breeding prospects of a stud animal. In the spring the fertilising elements are most numerous, but as the animal becomes jaded after artificial stimulation, they prove fewer and less active in their movements and behaviour. The reproductive powers are greatest in animals when the sap is rising in the trees. This seems to have been observed in the earliest times. The testes of the horse, bull, and boar do not waste away in the autumn months, but are less active under natural conditions—that is to say, when not artificially excited by the requirements of domestication and inherited capacity to suit man's requirements. Judicious owners of a stallion not only take him off the road as early as they can, but let him down in condition for a period of what may be called physiological rest. It is easier to get such an animal up into fine fettle than it is to keep one always in plump condition and sexually active. Bulls and boars do not expend energy in travelling over dusty roads in warm weather, and, for other reasons also, are more equable in their sexual powers, but for all that they are more sure getters in the spring than any other period of the year.

Only when the male appears to fail with numbers need we charge him with default. What of the females?

It is a grievance with all leaders of stallions that old and sour mares are put and stinted again and again, without much hope of result, while the owners always blame the sire. The causes of barrenness in females are not easy to discover. If they never commence to come in season, we may have good reason to suspect them as imperfectly equipped for reproduction. If the age is reached at which they should show signs, and they do not do so, they are under very grave suspicion, unless there are circumstances of an extenuating kind. Among these are poverty and ill doing, and anæmia, following on illness or starvation. Power of reproduction is the crown of health, it has been said, although we know many poor but healthy animals become pregnant. It is, however, a truth with exceptions. One of the exceptions is the tuberculous subject, who, in the highest order of creation, is commonly precocious and fecund, like a dwarfed plant in a drought, that must quickly reproduce lest it die and the species become extinct—" for the individual withers but the race is more and more."

The disappointments in the very young are more often due to imperfect maturation of the ova, or the want of eggs in the ovary. The periods of œstrum or rut correspond with the maturing and escape of ova, which must in some part of the canal come in contact with the male germs and be fertilised. They may be imperfectly formed. They may have an hereditary insusceptibility, as we have assumed in the case of some pedigree stock which has been bred for points which do not include fecundity: or, to put it in another way, the obtaining of certain points or conformation is at the expense of fecundity, because it is a departure from an established type. The virgin failures are often attributable to the above causes. But what about those animals which produce young on the first attempt and fail again to become pregnant within reasonable limits of time? These cause more loss, perhaps, than any other class. To the little man who keeps two or three sows their failure to stand to service means the difference between a profit and a loss on his operations.

Missing the first heat is a great mistake, because all observant breeders, without any pretensions to science are of opinion that the first period after parturition is the most likely to be fruitful. The tissues seem to be in a specially susceptible condition for establishing the breeding habit. A heifer that has had a bad calving, or a cow in poor condition, is often allowed to pass this period without service because the owner fears she will not make flesh and carry her young at the same time. He loses an opportunity. He is more likely to be incurring a just penalty for not having kept his stock well enough. This applies even more to sows than to cows. Indeed, it is like that " tide in the affairs of men," etc. Sows denied at the time following on weaning will often go right through the year, remaining an expense to the farmer when they should have brought a farrow and been ready for another. Experienced horse breeders are quite opposed to the view that a mare should be mature in order to produce the best. Some of the best foals are from three-year-olds, and these are the mares that go on year after year, because they have established what we have called the breeding habit.

How can we overcome these difficulties or save time, which is money? We will begin with the horse. The filly should be in glowing health, but not too fat, even if fairly covered with meat. She should have a bright eye and the whites, as well as the membrane inside the nostrils, should show a nice salmon tint. If these membranes are pale she is not in robust health, no matter how fat or which way her coat lies. She is not in the best form for egg production. Here, again, we would refer to the pullet or laying hen. You know at a distance, by the hyperæmic comb, if she is about to lay. She has a superabundance of iron in her blood, and a capacity for building more than her own tissues require. So it should be with the mare, the cow, and the gilt, for they all produce by eggs. The difference is that birds incubate them outside and quadrupeds inside. If the colour is wanting; if the animal is short-winded when pushed at a pace for a short distance; if her manner is listless.

she needs invigoration by, primarily, the digestion of a liberal ration, and, secondarily, by the introduction of nerve and ovary tonics and stimulants. The last may save a valuable month or two, and even determine a fruitful or barren year, if judiciously employed.

But reliance upon drugs, without nutritive food in sufficient quantity and at regular intervals, is not the way to get the best results. Other cases in which conception is delayed or impossible are due to a variety of causes. If the ovarium, like the udder, undergoes a fibrous degeneration, the animal is of no further use for breeding; but it sometimes happens that it is the case with one ovary and not with the other, or the change has not involved the whole organ, and some portion is still functionating. The heats observed in such cases are feeble, and service often unsuccessful; but with good fortune a cow or mare will sometimes bear just that once, and post-mortem examination proves that it would have been impossible to do so again. There are no diagnostic symptoms on which we can rely in quadrupeds. It is a curious, but well-established fact, that sex obliteration is followed by changes in the individual, all in the direction of the opposite sex. Thus it has frequently happened that a hen pheasant shot in the ovarium, but surviving the wound, has put on the male plumage in a subsequent moult. Capons made such at an early age have features more nearly resembling hens. Everyone is familiar with the narrow head and light forehead of the steer compared with the bull, and the striking differences between the horse and the gelding. In the matter of external signs very few can claim to recognise changes causing barrenness, but many will have noticed changes in the voice and manner or general behaviour of animals lost to the breeding instinct. "VET." in *Farmer and Stockbreeder.*

**Type and Size in Shires.**—With a breed of horses for which there is a world-wide demand, it might be supposed that a variety of types would be desirable, or that the class of animal which finds favour in one country would be unsuitable for another; but the Shire is needed only for heavy draught purposes, or to add weight and substance to the native draught-horse stock of other countries. It is long since horses of this class were used for carrying armour-clad knights to battle, consequently it is not necessary to encourage the breeding of anything but a massive-limbed animal square in build, very deep in the rib, and short on the leg, points which give the Shire its superiority over all other draught breeds, and which must be maintained for draught purposes; therefore any leanings towards a flash and leggy type should be discouraged by those who judge animals of this popular breed at the shows in the country. There is a tendency on the part of a few present-day judges to place a big overgrown candidate in front of a smaller but more correct type of Shire, although the latter has the weightiest set of limbs, so that the question may be asked whether the craze for size can be pursued with safety. Mere size, or height, is not always indicative of true Shire character, especially if it is obtained at the expense of feet and legs.

It is certainly more difficult to find a horse standing 17½ hands as proportionate as one two or three inches lower, and when it comes to actual shaft work the tall animal is the first to show signs of wear. Of course the opinion prevails that " a good big horse is better than a good little one," which is true within reasonable limits; but among Shires the biggest stallions have not proved themselves the most successful sires, neither have tall mares bred the most valuable stock.

Of late years a considerable addition to the length of show animals has been noticeable, but whether this is an unmixed blessing is a debatable point. In any case it is a departure from the type of the Old English Black Horse of Bakewell's day. His idea of a cart horse was that he should be " thick and short-bodied with very short legs," while he favoured a short neck also, as he maintained that " his ears ought to stand perpendicularly over his fore feet."

In Sir Walter Gilbey's book on " The Great Horse," several illustrations of Shires are given, from which it may be seen that the originals were of the type favoured by the great live stock improver above mentioned. Bakewell is said to have turned four acres a day with one man and a Rotherham plough with a pair of his improved blacks, which was four times the amount his neighbours got done with the same strength. This is pretty conclusive evidence that the short-legged Shire with a well-coupled back is the type to encourage for work and wear.

It is a noteworthy fact that more London championships were won by the Tring Park Stud than any other, and always by animals conspicuous for massive limbs and well-coupled backs, a type of which the great sire Childwick Champion is a striking example. That it has now ceased to exist is a real misfortune to Shire horse breeders.

At some shows specimens have found favour which were decidedly leggy, with such length of body as to make them look shallow at the flank and short in the rib. This is not quite the type to propagate, as they cannot stand the strain when backing a load as well as those of the strong-loined and muscular type can. Therefore, it may be asked whether the back and loin should not be taken more into consideration when judging, as well as the "feet, joints, and feather," notwithstanding that it is said "the top can change, the bottoms never." If the top changes, or appears to change, it is through being loaded up with fat which hides a lot of defects, and that of a slack loin in particular. A short-ribbed and shallow colt grows into a horse with the same defects, but these are less obvious in a fat than in a lean animal.

By paying more attention to the top it is not suggested that the bottoms should be neglected or that palpable defects in feet, joints, or limbs, should be passed over. As regards the feet of Shire horses they get better each year, this being to a great extent due to the fact that the feet of colts are not neglected till the animals are worked, as they were in bygone days. At the present time all the best young stock are shown during colthood; consequently the feet must be kept in shape for that purpose. But some part of the improvement is, of course, due to the use of sound-footed parents, and to the fact that good judges work on the "no foot no horse" idea. There is, however, a noticeable defect in the forelegs of many Shires, even high-class show horses (and it appears to be on the increase); this is, that the cannon bone recedes below the knee instead of being straight from the knee to the front of the fetlock joint. This gives many an otherwise good animal a common appearance when taking a broadside view of the forelegs; moreover, this type of foreleg is not the best possible for a swinging stride and good knee action. One also notices hind legs which leave something to be desired in angle when standing, and in leverage when in motion; so that the placing for prizes is always a matter of balancing the strong and weak points of the candidates.

Classes for Shire horses have been included at almost every show in the country, and it is of the utmost importance to give the large and the small breeder equal encouragement, but in order to do this more of the classes for young stock should be confined to those who have taken the pains to rear a foal and grow it on. Therefore the words "bred by the exhibitor" should be more frequently seen in show catalogues where the classes are restricted to tenant farmers, otherwise the honours may go to men who have purchased an animal at a long price merely for show purposes. The existence of such an animal in a district tends to deter the small tenant farmer from making an entry for a class in which he knows the celebrity will appear. By adding the four words above written to the majority —I do not say all—of the classes for tenant farmers the exhibitors would compete on fairer terms, and the man who keeps even one good brood mare and puts her to the best sire in his district is quite as deserving of encouragement at a local show as he who can write a big cheque for a show animal but does not attempt to breed one. The shows of the past season have, unfortunately, been very few in number. but those held proved very successful considering the conditions under which agriculture, which includes Shire horse breeding, is being carried on.—J. ALBERT FROST in *Live Stock Journal Almanac.*

**The Breeding Bull.**—It is a wise plan to get the very best animal that can be secured at a reasonable price where a breeding bull is in question. Do not call a price unreasonable if you are called upon to pay a little more for an excellent animal than the price of an ordinary one. By all means secure a well-bred animal; let him be a true type of the breed whose name he bears. Let individual merit be the first point to be considered. and back this up with a strong vigorous constitution, and a well-established lineage of meritorious animals. He should be uniform in quality; not strong in one point and weak in another, as his progeny is just as liable to inherit the weak points as the strong ones. With uniformity you can expect uniform results. The class of cows in a herd should to a certain extent govern the choice of bulls. For cows that are loose, overgrown animals. choose a bull of more compact build—an earlier maturing animal. For cows that are close-built and under-sized choose a bull larger and more rangy. For cows of proper form and size choose a bull of similar form and size, but avoid the continuous mating of close-built, compact animals, as observation and experience show that such a course will result in deterioration of size.

Shorthorns possess dairy strains to an extent with which no other beef breeds can compare; therefore, do not lose sight of the value of dairy strains in the breeding bull. A model Shorthorn bull should weigh at maturity not less than 15 cwt., nor more than 20 cwt. He should be red or roan in colour, his nose flesh-coloured, his eyes bright and clear, his head well proportioned, broad, and full between the eyes, his horns of medium length, strong and well set, curving in and down rather than upward. The neck should be in proportion to his body, not too long, nor too short, a little full midway between the horns and top of shoulder, and clean cut and slightly arched from the throat to the breast. His chest should be broad, deep, and yet well developed, his fore-legs wide apart, yet set well under his body, straight, clean cut, and fine from the knee to the hoof, from the top of his shoulder to the root of his tail straight and broad. well filled behind the shoulders and from point of hip to root of tail, and strong across the loins. His body should be of good length and depth, his ribs well sprung and closely coupled to the hip, his lower line almost parallel with his upper line, his hind-quarters broad and well developed, tied low down, his hind-legs straight and strong. He should stand square on his feet. His tail, set on a level with his back, should be small and tapering, his hide loose and mellow, his hair fine, thick, and of good length. Animals of pronounced dairy strains are usually of rougher build than those of a beef type.

Having got the bull we should aim to keep him in good, healthy, thriving condition, not over fat. In order to do this, he should be fed regularly and at proper intervals with good substantial food, such as hay or grass, with sufficient grain, such as oats and bran, to keep him in proper condition. Water should be supplied regularly and at least twice a day. When kept in a good cool box-stall in the summer this is sufficient, but if kept in close, hot quarters he should be watered at least three times a day. He should be provided with proper shelter to protect him from the summer's heat and winter's cold. A roomy box-stall is best, as it gives him more freedom and is safer for an attendant, as he can feed and look after him without placing himself in such a position as to take chances of getting hurt. His hind hoofs, when too closely confined in a stable, are apt to grow and become unshapely—not wearing off at all, but turning up in front, and preventing the animal from walking squarely on his feet. When the hoof gets in this condition it should be shaped properly by means of saw and chisel. He should have regular exercise, and if there is not a small field adjoining his box into which he can be turned out, he should be taken out for a mile or so every day. He should be handled gently and quietly, and his strength not overtaxed by excessive services.—" EAST COAST " in *Farm and Home.*

**Sheep Culture of the Century.**—Among the magnificent pens of sheep which are to be found in the Royal Agricultural Hall at Islington during the Smithfield Show, there will probably be examples of the best-known breeds of sheep now cultivated in England—the exquisite Southdown, his cousin, the stately Hampshire, and scarcely to be distinguished from him, at any rate by those who are not experts in such matters, the Oxford Downs, the Shropshires, with fine form, and the Devon or Exmoors, reminding our stag-hunting friends of the dainty Porlock mutton, which forms such an important dish in the West Country *menu.* Probably the Cheviots and active Border Leicesters will also be there. Welshmen are nearly sure to keep them in countenance, and it would nowise surprise us to see the Black-faced Highlander, who will condescend to be confined by no wall or fence the Saxon can invent, when he leaves the " land of brown heath and shady wood " and Gaelic attendants for the Lowland pastures and turnips, which are to turn him into prime mutton; mutton, which our mentor in ovine matters used to say there was nothing to equal, provided it was a well-hung haunch, cut from a prime five-year-old wether. Jonas Webb said the same of a joint from a Southdown.

How many of the visitors who look over these pens will wander in thought to what the same breeds were a hundred years ago? Not many, we expect; yet to some of us, at any rate, there is wondrous pleasure in looking back to what many of our flocks were like when we could first remember them. By noting the improvements that have been made in our time we can give a very shrewd guess as to the work that must have been previously done, for the foundation-stones had been already laid in many breeds, and it was only the superstructure that had to be reared, and what artists would call the finishing touches put on.

In 1788 the sheep were, probably, a coarse lot, take them altogether. Bakewell, of Dishley, in the north, and Ellmann, of Glynde, in the south, had not arisen then to show their brother farmers that quality was quite as important as size, and that by attention to pedigree and breeding for special points sheep could be got to feed into good mutton in about half the time that had hitherto been considered necessary. Even if Bakewell's work was begun, his secret was pretty much locked in his own breast, and his neighbours had not as yet commenced to benefit by his experiments. To these two men we must accord much of the credit for the improvement in all, or nearly all, flocks, as there are very few breeds that have not been ameliorated in some measure by either the Leicester or the Southdown. Yet the old folk must have had good material wherewith to start on, if we may judge by the Rev. John Dyer's description of a ram (1757), which runs thus :—

" The ram, short-limb'd, whose form compact describes
One level line along his spacious back ;
Of full and ruddy eye, large ears, stretch'd head,
Nostrils dilated, breast and shoulders broad,
And spacious haunches, and a lofty dock."

That Lincolnshire parson was not very much in the dark as to what a sheep should be. We do not, of course, know whether he was alluding to any particular breed, or, if so, what breed it was he had in his eye, but, save, perhaps, in a few unimportant particulars, I fancy his ram would pass current with most flockmasters as about the right sort, place him where you may. Probably, as the poet lived at Coningsby, in the Lincolnshire Fens, when he wrote, or rather revised, "The Fleece," the ram was of the Lincolnshire breed, as, in all probability, he would take his models from the flocks which most nearly surrounded him. However, it must be remembered that he had previously gained a considerable insight into matters rural and agricultural at Mapleton, in Herefordshire. "The Fleece" was published in the year 1757.

There is no doubt but that in the counties of the South of England horned sheep were general, if not universal, except in Sussex, where the ancestors of the little Southdowns cropped the sweet herbage of the hills and downs, then far more extensive than they are now. Gilbert White, of Selborne, on the east side of Hampshire, describing one of his annual journeys across the South Downs to Ringmer, near Lewes, in Sussex, in a letter (1773) to his friend, the Hon. Daines Barrington, says:—

> "One thing is very remarkable as to the sheep. From the westward till you get to the River Adur, all the flocks have horns, and smooth white faces, and white legs, and a hornless sheep is rarely to be seen. But, as soon as you pass that river eastward, and mount Beeding Hill, all the flocks at once become hornless, or, as they call them, poll sheep; and have moreover, black faces, with a white tuft of wool on their foreheads, and speckled and spotted legs, so that you would think that the flocks of Laban were pasturing on the one side of the stream, and the variegated breed of his son-in-law, Jacob, were cantoned on the other. And this diversity holds good respectively on each side from the Valley of Bramber and Beeding to the eastward, and westward the whole length of the Downs. If you talk with the shepherds on this subject, they tell you that the case has been so from time immemorial, and smile at your simplicity if you ask them whether the situation of these two different breeds might not be reversed. However, an intelligent friend of mine near Chichester is determined to try the experiment, and has this autumn, at the hazard of being laughed at, introduced black-faced hornless rams among his horned western ewes. The black-faced poll-sheep have the shortest legs and the finest wool."

Here we find not only the confines of the two diverse breeds, but also that the old Hampshire horned sheep held sway some considerable distance into Sussex itself; and, moreover, it is exceedingly probable that the Chichester friend of Gilbert White was the first man who essayed to produce what has since developed into the famed breed of the Hampshire Downs. That letter is dated December 9th, 1773, so that we may take 1774 as the date when the first Hampshire Down lambs fell, and there can be little, if any, doubt that this applies to the Wilts, Oxford, and all the other Downs as well.

Moreover, we also learn that in those days the Sussex sheep had black faces and speckled legs, very different from those of to-day. But then Mr. Ellmann had certainly not completed his work amongst them, even supposing he had commenced it, which is doubtful. Although the black face has been totally eliminated from the Sussex sheep, it still exists in his descendants on the westward Downs, and is accounted one of their principal features. These crossbreds soon came into a considerable amount of notoriety; indeed, it was not many years before they were looked upon as an established and distinct race, which, however, has since been much modified by further infusion of the Southdown blood.

Amongst some of the first to make a name for them were the Budds, the Dales, Courtneys, Saunders of Cranborne, the Pains, who were all, or nearly all, ram breeders, and several others in Hampshire, while the Rawlences and Waters carried on the work in Wilts, and in some instances reversed the cross by getting Sussex ewes and putting their horned rams to them; but the effect was very much the same in both instances. Early in the 19th century, however, nothing like the prices were realised that have been obtained in modern days, and we have it on reliable authority that on one farm a hundred young turkeys reared by the good wife made more money than the hundred best lambs.

That, however, must have been quite an exceptional case, as it is well-known those breeders mentioned made really good prices of their ram lambs, and a story is still current in Hampshire of two rival brothers bidding for a lamb at auction. Both not only wanted the ram, but were inclined to run jealous, so that one, when the price had run up to twenty-five guineas, came out with "I'll give fifty for him," thinking, of course, his brother farmer would cap the bid. He was, however, chagrined when the other took off his hat, made him a bow, and said, "As far as I am concerned, you shall have it, sir."

Mr. Frank Budd, of Hatch Warren Farm, near Basingstoke, who followed in his father's footsteps, did not sell by auction, but, having saved his hundred best lambs, called his friends and customers together, gave a good lunch, and then let them take their choice, first come first served, at seven guineas apiece ; and after that could make as good an average of his wethers as any man in Hampshire. His ewes were sold by auction at Overton Fair, in lots of either ten or twenty, and realised very large figures. In those days over three guineas a head was by no means an uncommon price for draft ewes from the best flocks, and those who did not aspire to the fame of ram breeders would realise little short of ten shillings less, and that for the most part without the aid of corn or cake. Indeed, neither ewes nor lambs were taken to the fair in anything like such forward condition as has been the custom of late years, and from thirty-five to forty-five shillings was the price of good lambs, guiltless of extra feeding beyond the clovers, sainfoins and turnips grown on the land. Of course, those who bred ram lambs forced all their stock more, and Mr. John Pain, of Houghton, near Stockbridge, made of his best hundred wether lambs 47s. 6d. each, and the culls made 40s. per head, after selling a hundred ram lambs ; but Mr. Pain had a farm in a hundred for sheep as regards the arable, not an acre of it that would not carry them in nearly any weather, and keep them clean into the bargain, besides having a large amount of good water meadow land, and irrigated by the river Test, on which to bring them forward in the spring.

It was on the adjoining farm that Mr. Twynam made his experiment with the Cotswold cross, which, however successful in the first dip, did not answer when carried further. That was also a wonderful farm for sheep. These crossbred lambs realised very high figures when fit to go to the butchers at once, or almost direct from the hands of the breeders, and that was what they were fit for, rather than keeping as stock. A man who bought old ewes every year from the best Hampshire Down flocks, put them to Cotswold rams, and kept mother and offspring going as well as he possibly could, and the succeeding summer would sell out and realise large prices. That was what Mr. Mortimer, of Grateley, Andover, did, when he made such a long figure for lambs of this class. This, however, was not the system of Hampshiremen generally, and Mr. Mortimer was not looked on in the light of a regular tenant farmer, but rather had his land as a hobby.—" N." in *Live Stock Journal.*

**Commercial Sheep.**—We are told on all sides that as regards mutton the public demand is all for small joints and lean meat ; and yet, in opposition to that, we hear farmers complain that they cannot grow their sheep big enough, and on that account in recent years there has been an ever-increasing demand for rams of the larger breeds for crossing purposes. In the case of the pure breeds, the larger ones are ousting the smaller ones for the simple reason that the demand for rams of the smaller breeds is becoming more and more limited. The crux of the matter is that the smaller breeds of sheep are slow in coming to maturity, whereas the larger breeds have all more or less early maturing characteristics, and get to good weights at an early age.

It is, of course, always reasonable to assume that the majority of farmers know, or soon find out, the class of sheep which pays them best, but it is questionable if many of them have ever carefully looked at the matter from the point of view of weight of mutton and wool they actually sell off the farm. They send their tegs to market, and if they are big and well-grown, and fetch several shillings a head more than their neighbours' at a given age, they are pleased and well satisfied. But perhaps their neighbours are marketing two sheep to their one, and consequently turning out considerably more mutton and wool per acre than they are. The larger Down breeds, such as the Oxford, Suffolk, and Hampshire, have done, and will continue to do, great service for crossing purposes, inasmuch as they, when crossed with some of the smaller, slower maturing breeds, give their produce those characteristics which are desired, viz., to grow quickly into sizeable weights of good mutton. In these cases the ewes with which they are crossed give the produce the quality of mutton and the joints of saleable size, while the sires give the quick growth and early maturity which are required to make up the profitable sheep.

In the writer's district a decade ago nearly all the sheep were of the Oxford-Hampshire or Hampshire-Lincoln cross, sheep of enormous size, but great consumers. Now the popular sheep of the district is a Scotch-cross ewe crossed with an Oxford or Suffolk ram; and this class of sheep has nearly ousted the larger type. The reason is not far to seek. The big breeds of sheep are very large consumers. A ewe of the Oxford type will eat almost as much as a yearling beast. On the poor, cold land prevailing in the district they were not very prolific, and as sheep of this type had of necessity to be run thinly on the ground, there could never be a very large output of mutton or wool. Farmers have discovered many advantages from keeping ewes of a smaller type. For instance, they are more handy, they are more prolific, they are much smaller consumers, and can, therefore, be kept in greater numbers. Consequently the output of mutton and wool per acre has been much increased, and it is obvious which class of sheep proves itself the most profitable in the long run. It is easily possible to maintain 50 per cent. more ewes of any of the smaller breeds than of the larger ones on a given acreage, and with reasonable luck the smaller breeds will produce 25 per cent. more lambs. These, if a good cross by rams of the larger breeds, will realise, whether sold as stores or fed off on roots or grass in later life, prices within a few shillings per head of those obtained for lambs bred from the larger type of ewe. It is easy to realise which comes to the most money, *e.g.*, 100 store lambs at 40s. each, £200 ; or 150 at 35s., £262 10s. This, too, is allowing for an equal crop of lambs and for a difference in value of 5s. per head, a fair amount in a store lamb, but the cross lambs from the smaller type of ewe often realise as much as some of the bigger, coarser lambs. What they lack in weight they make up for in quality.

Everyone, however, knows full well that there is a good deal of truth in the contention that when we have done weighing we have done selling, and that there can be no possible advantage in breeding from a smaller type of sheep unless we can turn out a larger weight of mutton and wool. That is what the writer maintains can be done. Farmers must cater for the public taste. If the public are prepared to pay a better price for small joints with little fat and no waste, then the farmer who endeavours to supply the public wants is best studying his own interests. This is more especially so when he can do it with pecuniary advantage to himself. Every farmer wants to make the most he can by his stock, and if he can maintain a flock of 150 ewes of a smaller and hardier type where he could only maintain a flock of 100, he must be on the road to get a bigger output and better return.

It is not to be implied that the writer advocates the use of undersized rams, for such is by no means the case. The big, upstanding Down breeds have done yeoman service in enabling farmers to breed good quality, early maturing lambs from ewes of a smaller type, which can be kept in larger numbers. At present, what we are of necessity bound to use is a ram of large type of an early maturing breed to mate with ewes of the Scotch cross, Cheviot, Clun Forest, Masham, or ewes of that class, from which it is generally easy to breed a good crop of lambs inheriting early maturing characteristics and a fair amount of size from the sire, with hardihood, good quality mutton, medium joints and plenty of lean meat, from the dams.

It therefore seems that at present we are only able to obtain a profitable class of sheep in a commercial way by means of various crosses. The pure breeds of the larger types must be maintained to keep up the supply of rams which are more than ever in demand for crossing purposes: but there seems no reason why some of the smaller Down breeds should not be bred with those early maturing characteristics which have brought popularity to the larger breeds. It must be borne in mind that it is not altogether the size of the Oxford, Suffolk, and Hampshire that has made them so much in demand, but the fact that their produce get into good saleable weights at an early age from whatever class of ewes they may be bred. These breeds themselves do not produce the highest class nor most popular class of mutton. Why is there nowadays such a poor farmers' demand for Shropshire rams, for example? Simply because they are not big enough for crossing purposes, and their produce, like themselves, are slow at coming to maturity. There is hardly any breed of sheep more adapted to the public taste in mutton than the Shropshire, the quality of mutton being of the highest class, and the joints moderate in size, with small bone and little waste; but, for all that, farmers prefer to use rams of the larger breeds because the progeny grow into saleable weights very much quicker. Sheep farmers cannot be expected to show much euthusiasm for a class of sheep that needs an extra eight or nine months to come to maturity.

Size is not everything in a sheep, although it is essential in a ram if we are to get early maturity in the produce; but there is little doubt that the tendency in the future will be towards a sheep of moderate size, and at the same time one that comes to maturity early like sheep of the larger types. Big large-consuming ewes are unnecessary and less profitable to maintain than ewes of a smaller hardier type which consume much less food, are more prolific, better mothers, and altogether less expensive to keep. They will, by reason of the fact that they can be kept in greater numbers, turn out a greater weight per acre of wool and mutton.

There are many things to consider in reckoning up the cost of maintaining a flock of sheep, and such matters as the powers of consumption, numbers possible to be kept, amount of artificial food required, and so forth, must all be taken well into consideration. Both the large and small breeds play an important part in our system of sheep keeping; but one cannot help feeling that a good pure breed that could squeeze in between and fulfil the purposes of both is the sheep of the future. Cannot the Shropshire breeders rise to the occasion? They have the right material, but they must increase their size to some extent, and, most important of all, breed for early maturity. Cross-breeding has become a commercial necessity in order to obtain the class of sheep which the public demand and which best pays the farmer to keep.—" T.B.G." in ***Farmer and Stockbreeder.***

**Sheep on the Farm.**—Farming is the most difficult and complex business under the sun. There are no universally applicable rules. What is right on one class of land is wrong on another, and no two farms need exactly the same management. There is no prettier problem set us than to determine exactly the place of sheep on the farm, and where and to what extent they should be kept. There was a time when sheep were absolutely necessary on almost all land; upon their manurial value the fertility of the soil almost wholly depended; but with the discovery of so many kinds of artificial manures, we have entirely to reconsider the position.

No one would dream of suggesting that anything could take the place of sheep on mountains. It is their natural habitat. In the struggle for existence in pre-historic times, the timid sheep, without weapons of offence or defence, had no resource but to take to the mountains for safety. Without it the whole race would have been exterminated by beasts of prey. Through the ages they fitted themselves to their environment. Only the hardiest survived, and they accommodated themselves, in size and agility, to the sparse herbage and the almost inaccessible cliffs. They also developed covering which enabled them to withstand the rigours of the altitudes where they alone could live. On so scant a common their numbers were necessarily few, and this habit of roaming over large acreages has become a leading characteristic of the race. No ordinary fence will stop a hill sheep when brought on to our lowland pastures. Even our larger sheep have the same longing. No matter how good the keep, and how recently turned in, they bleat with delight and scamper off to follow one that can find a hole that he can bore through. On the hills sheep are the only stock that can be profitably run, and except for the extra care that they get in winter they are as nearly as possible under wild conditions. On the light soils of Norfolk and on the chalks of Yorkshire and Lincolnshire, and also on the chalks which cover so much of the South of England, sheep are in their right place, as in all these cases the consolidation of the land by their trampling is only of less benefit than the manuring. With large, arable tracts, especially where so much straw is sold off as in the South, there is never long-dung enough to go round.

Artificials, excellent as they are, and bound to come more to the front, cannot keep land in the highest state of fertility and in the best of texture without some animal dung. For this reason sheep will always be kept on these soils. One has only to walk over a break immediately after the sheep are moved on to the next to realise what wonderful manurial agents they are. Practically the whole surface has received either liquid or solid excreta, and this, which is the argument in their favour on arable land, is the chief one against keeping them permanently on pastures. When living entirely in hurdles sheep are notoriously healthy, the only causes of trouble being an excess of roots with in-lamb ewes, or forcing the fat sheep a little harder than they can bear.

On stronger soils, in which there is a large proportion of clay, sheep do not play so important a part. Turnips on such soils are a risky crop, the sheep do not thrive so well as they often do on a wet lair, and the land is often poached so seriously as to interfere with the succeeding crop. Also, sheep prefer light soils, and do best on them. Only this summer I had three grassfields being grazed together on account of the water supply. All three were equally sweet, having had no sheep on for months. One of the three is a light soil, and although not such good land as the other two, I noticed that a score sheep, which were running with the cattle, spent the whole of their time on the light land. I several times drove them to the farthest field—the best of the three—but they were back again in a few hours. Strong, arable soils can be kept in condition cheaper by artificials, with dung at rare intervals, than by sheep. On good farms in the Midlands, which are chiefly pasture, sheep are often run too thickly for profit, and I doubt if it ever pays to keep a breeding flock under these circumstances.

On mixed farms, of which about half is arable, sheep of necessity get a great deal of change on rotation seeds, if only allowed an early spring bite with the lambs, and again on the aftermaths. It often happens that a field is grazed the second year before being broken up for fallow. There is also change in clearing up the stubbles and the bits of any catch crop which is taken, even if the bulk of it is not root land. On a farm of three hundred acres of this class I kept a breeding flock of eighty ewes for ten years, without the least sign of deterioration. The ewes were for the most part on the poorest grass land at one end. They always had a few weeks on the twenty acres or so of first seeds before they were shut up for mowing, and spent part of the summer on second seeds. The lambs were put on to clover aftermaths after weaning, the wethers going from there to the roots on the light end of the farm, and the ewe lambs wintering on the dairy pastures, where there had been no sheep all summer. Under these conditions the flock remained healthy and comparatively free from all parasitic diseases. The wether hoggs went off the roots in March and April at 60s. to 70s. each, and paid well. I moved from there to a farm nearly all pasture, and with arable land that was too heavy for roots and not sufficient in quantity to allow of much rotation seeds. The farm had been fairly stocked with sheep for many years. The decline of the flock set in from the first, and in a few years I cleared right out to my great benefit, and gave the farm a rest from sheep for several years. On good land one is apt to run sheep thickly, because there is plenty of grass, forgetting that the bulk of it has been stained with their own urine.

Everyone knows how much better sheep do on new turf than on old pasture. This is not due to the intrinsic value of the new grasses for feeding purposes so much as to the freedom from sheep taint. It is impossible to avoid this on a grass farm, as none of it can be rested more than a few weeks at a time, except the pasture that is set aside for mowing. It often happens, too, that the best pasture is set aside for fattening cattle or dairy cows, amongst which many sheep cannot be run, therefore the poorer portions of the farm become still more sheep-crowded. The result of this is more apparent in the lambs, as they suffer more from husk and tapeworm than do older sheep. Although these evils can be minimised by the use of arsenical tablets—the best remedy that I have yet found—yet the lambs never make the best growth nor look bright on the skin. When they cough badly in September if a quiet dog is sent round them, or have a tendency to scour in winter, despite a fair allowance of corn, it is a certain sign that the land is sheep-sick, and that it will pay the owner to give it a rest.

Both ewes and lambs will suffer from foot-rot, and although this can be kept under by continual paring and dressing, yet the labour is excessive, and that is a serious consideration in these days. Indeed, if we reckon, in addition, the work with lambing, clagging, washing, shearing, and dipping, there is far more labour required with sheep than with cattle, excepting only a milking herd. But even without all this, I find that cattle pay better than sheep kept as a permanent flock.

Because sheep do not eat a great deal of long fodder, the cost of wintering is underestimated. They are gnawing at the land the whole time, and are terribly in the way at spring. One can scarcely avoid taking a spring bite off the meadows, and this ruins the hay crop in a dry season, and, in any case, makes it so late that the hay is about in the risky month of July instead of the comparatively safe one of June. I had an instance last year. Two meadows were grazed bare, one by sheep and the other by cattle, up to May Day. The bullocks had the poorer meadow, and both were cut at the same time, yet the cattle-grazed one had far the heavier crop. Take two fields side by side, graze one with sheep all winter and rest the other. The latter will graze nearly double the stock the next summer. It is not only that sheep graze close and punish the plants more than cattle can, but they take the best of the grasses. Cattle never thrive so well if sheep are run among them. It is not as if ewes paid extraordinarily well for wintering. If we reckon labour and lambing risk, it is very rarely that ewes and lambs pay at the prices that ewes command at the autumn sales. On the other hand, if the land is rested during the winter, sheep can be bought at spring to pay well, either ewes and lambs or wethers.

If land has been overstocked with sheep for some years, the better way is to give it absolute rest from them for a year at least, and better still for two. There is no doubt in my mind that the sheep-smell attracts flies, for they have maggots much more on heavily stocked farms. After a farm is once sweetened, sheep may pay well to summer at the rate of one to two acres. When land is sheep-tainted either basic slag or ground lime will be found beneficial. Land can be grazed perfectly by cattle if one colt to ten beasts is allowed just to do the clearing up. All stock are better for a change of pasture, and a herd that has two fields, and uses them alternately for a fortnight each, will do far better than if they had the run of the two for the whole summer. But cattle do not seem to suffer from running thickly as sheep do, and providing there is enough for them to eat, seem contented enough. The reason, probably, is that their excreta cover a comparatively small portion of the area they graze. Sheep are splendid stock in their right place.—" LEICS," in *Farmer and Stockbreeder Year-book.*

**Water in Grass and Roots.**—It is doubtful whether sufficient allowance is made for the increased quantity of water existing in grass, during a continuance of wet weather, as compared with the amount of water usually existing in grass during fine dry weather.

It is still more doubtful whether in changing sheep from grass to roots, such as turnips and swedes, sufficient allowance of dry food is provided to compensate for the much larger quantity of water contained in the above-named roots compared with the much smaller proportion of water contained in permanent pastures or grazing meadow grass.

Sheep under normal conditions seldom desire to drink water except during long continued periods of drought, and grass is certainly a much more natural food for sheep than turnips or swedes, which cost so much to produce, and yet are of such a watery character that some dry food such as chaffed hay or crushed oats has to be added if the animals are expected to put on flesh and fat, when standing, perhaps, up to their knees in mud during cold wet weather.

In order to obtain definite and reliable figures respecting the proportion of water, I personally collected a fair average sample of grass by cutting portions from different parts of a grazing pasture in a field in Surrey on the following dates during the past year on fine dry days.

### COMPOSITION OF MEADOW GRASS.
### COLLECTED ON FINE DRY DAYS.

| 1915 | | Water | Organic Matter | Mineral Matter | Nitrogen |
|---|---|---|---|---|---|
| February 21 | ... | 69·94 | 27·43 | 2·63 | 1·01 |
| March 21 | ... | 74·22 | 23·64 | 2·14 | ·95 |
| April 18 | ... | 73·70 | 24·26 | 2·14 | ·78 |
| May 16 | ... | 76·91 | 20·60 | 2·49 | ·59 |
| June 13 | ... | 71·36 | 25·68 | 2·96 | ·54 |
| August 1 | ... | 73·70 | 23·69 | 2·61 | ·72 |
| September 6 | ... | 71·85 | 25·36 | 2·79 | ·64 |
| October 3 | ... | 68·37 | 28·91 | 2·72 | ·69 |
| November 11 | ... | 68·59 | 26·36 | 5·05 | ·66 |
| December 29 | ... | 75·42 | 20·59 | 3·99 | ·76 |
| Average | ... | 72·40 | 24·65 | 2·95 | ·73 |

It will be noticed that the percentage of water varies from 68·37 in October, to 76·91 in May. The mineral matter varies from 2·14 in March and April to 3·99 in December, and 5·05 in November, while the nitrogen varies from ·54 in June and ·59 in May to 1·01 in February.

The average figures of the ten specimens may fairly be taken to represent the ordinary composition of the grass from this meadow during the year 1915.

Now let us compare the above results with the percentage of water in grass from permanent pasture, also taken by me during wet weather in December.

Water (lost at 212 deg. F.) after a wet night ... 84·18
Water „ „ „ on a damp foggy morning... 83·06

Average ... 83·62

It will be seen that grass during wet weather contains 10 per cent. more water and consequently 10 per cent. less dry feeding material than the average quality of grass during dry weather. Therefore during wet weather cattle and sheep cannot obtain anything like the same nutriment from the grass they consume because of its watery character. Hence, the great importance of giving some dry food during a continuance of wet weather, especially if associated with a low temperature or cold winds.

If we compare roots, such as turnips, swedes and mangolds, with wet grass we find the proportion of water is still greater.

| Percentage of water (lost at 212 deg. F.) | Turnips | Swedes | Mangolds |
|---|---|---|---|
| According to Watts | 90·57 | 88·88 | 88·26 |
| „ to Smetham | 91·51 | 90·42 | 87·89 |
| Average ... | 91·04 | 89·65 | 88·07 |

In plain words, in every 100lb. respectively there is the following amount of dry material, namely, in turnips only 8·96, in swedes 10·35, in mangolds 11·93, in meadow grass in wet weather 16·38, and in meadow grass in ordinary dry fine weather 27·60lb. Anyone can therefore understand that both cattle and sheep require a certain amount of additional dry food when out on grass during wet weather. Also that sheep when changed from grass to roots naturally require at least some good chaffed hay to make up for the watery nature of turnips or swedes.

The craving which sheep have for dry food when hurdled on roots in proximity to a hedge is well illustrated by the fact that all available dry leaves are always greedily eaten up, for roots alone are not the normal food of sheep, which, as we know, seldom drink water even when located on mountain pasture that affords a much drier and more concentrated food than turnips and swedes.—JOHN HUGHES in *Farm and Home.*

**Economy in Pig Keeping.**—Economy is the order of the day. Even in the matter of our present especial concern, the production of pigs and the manufacture of pork, there are many ways in which we can carry out economies by giving increased care and attention to the selection and management of the breeding stock, to the provision of the various kinds of food, and the manner in which it is fed to the pigs at the different stages of their being.

It is impossible to declare that the pigs commonly kept in country districts are within a measurable distance of perfection in either form, early maturity, or suitability for the various purposes for which the pigs when fattened are required. It would also be worse than folly to deny that in some few districts there has been a remarkable improvement in the form, character, and quality of the ordinary country pig, a change due to experience, to the imperative necessity of economising owing to the hard times experienced by well nigh everyone connected with the land, and, perhaps, more than in any other way to the continual publication in the agricultural and stock journals of articles, answers to queries, etc., written by men who have made a special study of the many questions connected with the breeding and fattening of pigs.

Notwithstanding this admitted and appreciated improvement there still exists very considerable room for increased attention to the selection of the breeding stock. Many people appear to consider that a pig of any defined or undefined type will produce pork of the many different degrees of fatness and size and proportion of lean to fat meat demanded. It may be that by careful feeding a near approach to the demands of the various markets may be secured, but it is certain to be at an increased cost, whereas by the selection of those breeds which have for several generations been bred for the provision of distinct forms and sizes of carcase, one can make almost certain of producing the type which will realise the highest price per pound.

The pig breeder of the present day is in a much more advantageous position than even some of the oldest of those at present living. It matters not what class of pork he wishes to manufacture, he has at hand pure-bred pigs especially suited to produce that particular kind. Should the pig-keeper's desire be to produce porker pigs of a carcase weight of 60 to 80lb., there is the Middle White or the Berkshire, or a combination of the two. In the latter case the demand for white-skinned pigs can be secured by mating the Middle White boar with the Berkshire sow, whereas if the colour of the skin is not an object, the reverse cross will probably prove to be the more profitable, since the Middle White sow is very prolific, and is besides a free milker over a comparatively long period. This is an advantage to the little pigs, as they are then likely to get a good start in life, a most important point, as the porker or London pig, which realises the highest price per lb., is the pig which arrives most quickly at a given weight of ripe pork.

Of late years there has been an enormous increase in the demand for fat pigs of from 110lb. to 130lb. dead weight, or, as they are called in some of the Midland districts, porker pigs. Save in the North and the manufacturing districts, these porker pigs are taking the place of the 200lb. to 250lb. fat pig. Amongst the reasons assigned for this marked change in the class of pork demanded is the decided objection of the labouring classes to eat fat meat. This is asserted to be due to the fact that with greatly increased earnings the consumption of meat per capita has so largely increased that to be comfortably disposed of the meat must contain a larger proportion of lean than in the olden times, when a smaller quantity of meat was possible in the families of the middle and lower classes. The Middle White and the Berkshire breeds of pigs and their crosses will provide just the kind and type of pig to furnish porker pigs.

The sides of bacon and the form and weight of hams which are most in demand and shortest in supply, and consequently the highest in price, have changed greatly of late years. In the good old times a very large and a very fat pig was the one which was considered to be the most suitable for conversion into bacon. Amongst the reasons for this was the belief, which has since been most clearly proved to be fallacious, that the greatest increase from the food consumed was made by the pig when it approached maturity and a state of complete fatness; another reason was that a large proportion of fat meat was necessary to render the extremely salt and hard lean meat more palatable. Both of these alleged causes have ceased to exist. It is now known, if not universally admitted, that it is the growing and young animal which gives the greatest return for the food consumed, and our best type of live stock will easily combine the growing and fattening stages so effectually that they will become ripe for the butcher at a very early age. The new system of curing has also rendered the old-fashioned system of heavy salting quite unnecessary.

This combination of the growing and fattening stages is beneficial in many ways. Nearly the whole of the most expensive pig foods furnish just those properties which a growing and fatting pig requires and which can be assimilated completely. Whereas, if the pig has been kept in a so-called growing state by feeding it on an insufficient amount of food, or on food containing a large proportion of innutritious food, until it has completed its growth or the building up of its frame prior to being put up to fatten, a large proportion of the nourishment of the food is wasted, solely because the pig has no use for it. It merely passes through the system, and is voided. In addition to this waste of food, there is another; this is caused by the mere prolongation of the life of the pig beyond that period which is essential to its arriving at the weight and degree of fatness which is required. In the summer, and still more so in the colder weather, a certain amount of food is consumed in the mere provision of heat to furnish warmth and to continue the life of the pig; to supply material for that wastage and renewal of material which is constantly taking place in the carcase of the pig; and also to furnish energy for locomotive purposes; in other words, to keep the pig alive and healthy.

The quantity of food required in ordinary circumstances for the mere prolongation of life has been clearly determined by certain experiments which were conducted in the United States by Sunborn. In these it was proved that pigs weighing about 50lb. required over 1lb. of middlings per day solely to keep them alive and healthy.

Pigs of three times this weight required relatively a somewhat smaller weight of food, in proportion to their live weight. No mention is made of the probable causes of this slight variation. A pig of the weight of about 100lb. actually requires weekly one stone of meal solely for its continued existence, in addition to the food which is given to it in order to increase its substance, so that if we give to a pig of the weight named 4lb. of meal per day just half of the food fails to give any increase in the live weight of the pig. Thus by following the out-of-date system of having a growing stage in the life of a pig over a period of, say, two months, that pig will have wasted something like 1 cwt. of meal—a most serious matter when, as now, the cost of meal approaches 11s. per cwt. This waste may easily render the production of pork unprofitable instead of profitable. In addition, the demand is much more keen for pork from young than from old pigs. Another advantage is that a greater number of pigs can be fattened with the same conveniences and with an equal amount of labour—in fact, quicker returns and larger profits are ensured. In the past it has been far too common, when fatting pigs, to confine them to one kind of meal. It is admitted that the best single food for fatting pigs is barley meal, but it is equally true that by adding to the barley meal an equal proportion of maize meal, which usually costs less, better returns can be obtained; further, by the addition of some 10 per cent. of vegetable food to the meal the cost of feeding is reduced, whilst the gain of weight is equal to that made by the pigs when the food consists solely of meal.

Another point, which does not receive at the hands of many pig keepers a proper amount of attention, is the preparation of the food. The usual plan is to mix the food just prior to its being fed to the pigs. So far as one can discover, no advantages are claimed for this system; its popularity may be mainly due to the fact that it gives scope to the common failing of postponing as long as possible any necessary work. On the other hand, the benefits derivable from the system of mixing the meal and water at least twelve hours prior to being fed to the pigs are very considerable. Especially is this the case where the meal is composed of hard corn, such as maize. It is well known that fatting pigs, when fed on meal and water, simply bolt their food; they make no attempt to masticate it. Even when care is taken by the miller—and this is by no means universal—there are sure to be large particles of meal which are not thoroughly softened and digested, and pass unused through the pigs, whereas, if the meal be mixed with water a sufficient length of time, the meal is so softened that it is thoroughly digested. Attention might also be here called to the fact that in cold weather a great saving of food is effected by raising by artificial means the temperature of the food. All that is required is the addition of a small quantity of boiling water immediately prior to feeding time.

During late years greater attention has been paid to the manner in which corn has been ground for the pigs. A few years since the opinion was prevalent that a saving was effected by merely crushing instead of thoroughly grinding the corn, and it was even asserted by some of the old school that an equal return was obtainable from whole corn as from the corn when ground. Both of these beliefs have been proved to be fallacious. Experiments have clearly shown that 92lb. of finely-ground maize will give an increase in the live weight of the pig equal to that obtainable from the consumption of 100lb. of whole maize. It is quite possible that the advantage in feeding barley meal as compared with whole or crushed barley would not be so great, but it is considered that where beans or wheat are fed the benefits derived from grinding are at least equal to those obtainable from the conversion of maize into meal. Now that the value of corn is so much higher than of late years, whilst the cost of grinding has not altered to any great extent, the advantage gained in grinding the corn is, of course, considerably greater than when the prices of feeding stuffs are much lower.

A mixture of food is also advantageous when fatting pigs, whilst a variety or change appears to be equally beneficial. A consideration of one's own objection to a continuation day after day of similar food should convince one that variety in the food of a pig would be appreciated and beneficial. It may at times be found to be difficult to secure a variety; in that case a change in the proportions may serve the same purpose, providing that the change is gradual. A complete and sudden change in the food means a loss of several days' increase of weight, whereas a gradual change is beneficial.

Regularity of feeding is most important. The most profitable pig is the contented pig. Whenever the pig is unsettled owing to the postponement of feeding time, a loss of weight is taking place. In fact, the more one studies the wants of the pig, the greater is the profit derived from it.—SANDERS SPENSER, in *Farmer and Stockbreeder Year-book.*

**The Improvement of Wheats.**—An interesting report has been received from the Home-grown Wheat Committee of the Incorporated National Association of British and Irish Millers. It gives an account of the work that is being done by the committee in conjunction with the Cambridge Institute of Plant Breeding in endeavouring to improve the yield and quality of British wheats. Briefly the work that is being done by the committee is stated to be:—(1) To increase the profits on wheat growing in this country so as to secure more wheat growing, greater national security, and increased agricultural prosperity; (2) to secure higher returns to the grower by producing wheats suitable to the commercial requirements of the millers in the district in which it is grown; (3) to increase the demand for British wheats by improving the quality. They recognise that as a commercial proposition it is impossible to compensate growers for substantially diminished yields per acre by improved quality, therefore it is necessary to secure improvement in quality without sacrifice of yield; or, better still, to improve both quality and yield.

In the fourteen years of its existence the committee has tested in the field large numbers of wheats, English, Colonial, and foreign, and the flour therefrom in the bakehouse, but it states that it has failed to find any existing variety which in the United Kingdom gives a sufficiently large yield of grain and straw and grain of first-class bread-making quality. It has found varieties which, when grown in the United Kingdom, possess the inherent and hereditary characteristic either (*a*) of yielding maximum crops of grain and straw, (*b*) of being immune or highly resistant to certain forms of disease, or (*c*) of yielding grain of first-class bread-making quality. The committee have recognised from the investigations of former years that certain wheats have the power of retaining their quality even under unfavourable conditions; others lose their quality with a change of environment. The capacity for retaining the quality for bread-making purposes is inherent in the variety, and can be handed on as a separate unit in the breeding of new varieties. Further, it has been found that the manuring of wheat as practised by farmers or at experimental stations has no appreciable benefit on the quality. Autumn-sown wheat under conditions as nearly as possible identical may be as strong as spring wheat, and wheats cut early do not show any superiority in strength over those cut later when the other conditions are the same.

In view of these facts the principal efforts of the committee are directed to obtaining by means of hybridising and Mendelian selection, from parents possessing at least one of these good points, a number of varieties, each one in the highest degree suitable for one or more of the differing environments found in the United Kingdom. The effect of environment—that is, the soil and climate—on quality is a well-known practical experience amongst farmers, but much more recognised forty or fifty years ago than to-day. The committee in the report say it has always recognised the great influence which environment exercises on the bread-making quality of the grain, but it has found that some environments which, when some varieties are grown, yield grain of poor bread-making quality, with other varieties yield relatively good quality flour. But a really good wheat will always be relatively better than a poor one under the same conditions, whatever the environment.

The practical application of this is that certain wheats suit certain soils better than others, and this is the experience of a good many farmers. The committee admit that the ideal wheat has not yet been produced, but we congratulate them on their determination to go on with their investigations till it is found. From the bread-making point of view the Canadian Red Fife appears to be the best in existence at present, though from a farmer's point of view the yield per acre is not high enough for this country. It is interesting to note that this wheat appears to be of Galician origin. The Canadian Red Fife is evidently the parent that must be used to impart "strength" in any breeding experiments, and is being so used in the various trials now going on.

Exactly what this "strength" is has not yet been determined, and no chemical analysis appears to show its presence or absence, though the baker regards it as of the greatest importance. It is the factor that ensures a large, well-shaped, loaf, of open texture and free from "stodginess." It enables the dough to retain the gases given off by the yeast, and thus permeate the mass with holes of varying size, which not only secures lightness, but at the same time increases the dimensions of the loaf. The baker avers that the public require a loaf of this kind, but it may be well worth considering whether the public will always demand such a loaf. Extreme whiteness is certainly demanded by a considerable section of the public, in spite of the fact that such bread is less nutritious than that of a more creamy colour. Some day the public may wake up to the fact that a very white loaf full of large holes is not the best criterion of a really good loaf of nourishing bread, and then white, very strong wheats may cease to be so desired, and fail to command the relatively high prices they do at present, compared with the less strong English wheats. The Millers' Committee are doing a good work in their efforts to improve the varieties of wheat generally grown in this country, and their endeavour to produce a high-yielding variety of good quality will be watched with interest by farmers.—*Agricultural Gazette.*

**The Importance of Pickling Wheat.**—Messrs. W. B. Mercer and F. P. Walker, of the Armstrong College, Newcastle-upon-Tyne, in a letter to the *Scottish Farmer* on the above subject, say :—

" The value of wheat at the present juncture makes the prevention of diseases, to which the crop is subject, a matter of national importance.

" One of the most destructive diseases in this district is the common ' smut ' or ' stinking smut,' or ' slayne,' or, as it is more properly named, ' bunt.' This malady may be recognised at harvest time by the presence in the ears of plump rounded bodies, somewhat like wheat grains, but containing a black fishy-smelling powder. When the crop is threshed, most of these 'grains' burst, and the powder escapes in clouds, settling in the machine and on the healthy seed. The powder represents the spores of the fungus which causes smut. Unless these spores are destroyed before the grain is sown, they will germinate along with the seed, infect the young plant, and a smutted crop will again result.

" A badly-smutted sample of corn may be recognised by its dark colour, and often by the presence of spore-containing ' grains.' Unfortunately, danger is not limited to seed which is obviously diseased. Threshers and winnowers through which smutted corn has been passed, and sacks in which it has been stored, become impregnated with spores of the disease, and pass them on to any grain with which they subsequently come in contact. By such means, corn from a perfectly healthy crop becomes infected, though seldom to such an extent as to be recognisable by the naked eye. That this is not a mere hypothetical course of events is evident from observations we have recently made. Last autumn a number of samples of seed wheat were collected and examined microscopically. Though they all appeared quite healthy, every sample was found to contain smut spores. It is evident, therefore, that it is not safe to trust to appearances, and the facts stated render it probable that most of the corn on the market is more or less infected with smut spores. For these reasons we strongly recommend farmers to dress all seed wheat before sowing, whether it appears smutted or not. The spores of the disease are easily killed by the application of poisonous liquids to the grain. The operation of ' pickling ' does not involve much trouble or expense. The seed should be spread out in a flat heap, sprinkled with a 10 per cent. solution of copper sulphate or blue vitriol (1lb. sulphate in 1 gallon water), and shovelled over and over (preferably with wooden shovels), till all the grains are moistened. The seed should then be spread out and allowed to dry. One gallon of the solution is sufficient for 4 bushels of corn.

It is advisable to purchase the copper sulphate in the powdered form, sold for charlock spraying, and to obtain a guarantee of 98 per cent. purity on buying. A dilute solution of Formaldehyde, usually sold as Formalin, under a guarantee of 40 per cent. strength, may be used instead of copper sulphate. In this case 1½ oz. of commercial Formalin should be stirred into 1 gallon of water, and the solution used in the same way as copper sulphate. A pint of Formalin weighs about 1lb. 4oz., and costs about 2s. It is a poisonous material, and should be kept in a carefully-stoppered bottle; wheat pickled with Formalin should be sown as quickly as possible after it is dry. The copper sulphate pickle is, in our opinion, the safer and more generally reliable dressing for wheat.

"In addition to pure chemicals, several proprietary substances—for some of which extravagant claims are made—are on the market. We have seen several cases recently where the use of these substances has been attended with disastrous results. The worst sample of smutted corn seen last year was from seed which had been dressed with a preparation whose advertised virtues included the suppression of smut.

"It is urged—we believe rightly—against copper sulphate and Formalin that they often fail to give protection against birds. Where this is known to be the case, the seed should be dressed twice—first with copper sulphate or Formalin, and then with whatever substance is most effective against birds. We know of no one substance which may be relied upon to give the double protection.

"Wheat is also subject to another kind of smut, which may be distinguished as 'loose smut.' In this case the whole ear, save for the central stalk and a few chaffy fragments, is replaced by a mass of black powder—the spores of the diseased fungus. Diseased plants stand out conspicuously just after the crop has 'shot.' Later on they may easily pass unnoticed, as the smut spores are soon blown away, leaving only the naked stalk. If these spores find their way into healthy wheat flowers, they germinate there and infect the young grain while it is small and green. The grain, however, develops normally, despite the fungus within, and when ripe it is impossible to tell a diseased grain from a healthy one without a microscope, and not very easy with one. Since the fungus is inside the grain, it is obviously impossible to kill it by applying fluids to the outside, and the only method of treating such diseased grain is rather cumbrous and difficult of application. It is advisable not to sow seed from a badly-diseased crop. If care is taken to sow only seed from healthy crops, no trouble from loose smut will be experienced."

**Thinning Root Crops.**—There is no operation associated with the after-cultivation of roots so important as that of thinning, and the sooner within reason the seedlings are allotted the maximum amount of space wherein to develop the better. There are but very few exceptions to this rule, it having been proved that considerably more harm is often wrought in thinning roots advanced in growth, and therefore more established, than in the case of plants that are comparatively young and tender. Like many other farming operations, the work of thinning cannot be accomplished just at that season of the year when it most calls for attention ; for example, in wet summers it is often impossible to work the hoe satisfactorily on heavy soils, and, if attempted, more harm than good is done, the plants removed being, as it were, transplanted by the heel of the worker as hoeing proceeds, to say nothing of the ill-effects resulting from the treading of the ground when wet. With all seedling plants it is of great importance that they should be kept growing steadily from the time they unfold their seedling leaves until the portion of the plant required for food is harvested.

If plants are stunted and starved in the seedling stage, the loss of growth and vitality can never again be made good through after-cultivation or the application of concentrated manures. Opinions vary with regard to how much seed should be sown per acre, but in no case can any hard-and-fast rules be laid down. Taking for granted that the seed has a high germination percentage, the amount to be sown will then be largely decided by the condition of the seed-bed. For example, on many loamy soils, where the surface soil is fine and capable of retaining moisture, it is not an uncommon practice to drill only about 2lb. of turnip seed per acre, while on rougher tilths quite 4lb. are required. Again, in sowing garden crops, readers will doubtless agree that, in the large majority of cases, seeds of winter greens sown in ordinary seed-beds, whether broadcasted or in drills, are distributed much too freely. Carrots may be cited among garden root crops as being subjected to extravagant sowing. Not that this is so disastrous where carrots are pulled when young and succulent. But in the case of main crops nothing more injurious could be conceived, than this thick sowing, which, I am convinced, is, in the majority of cases, largely responsible for so many main crops of carrots being badly infested with the carrot fly. It must necessarily happen that in thinning out the long, tapering roots the soil around the remaining plants is loosened, thereby affording an easy opportunity for the fly to deposit her eggs by the side of the plant. Advice has often been given to the effect that carrots should be thinned out after a shower of rain, as the flies are not then so much in evidence. Be this as it may, a still wiser plan is to avoid these thick sowings where thinning of the rows is essential.

From time to time, experiments extending over a series of years have been carried out in the singling of turnips in order to prove whether it is more economical to restrict the plants to narrow drills and to short spaces intervening from plant to plant in the drills; or to what extent these spaces could be increased with a view to securing a heavier yield per acre. As may reasonably be expected, these experiments go to show that in all cases a medium distance is preferred, and if anything the space should be rather limited than extended beyond the average. It is needless to quote figures, as this rule applies to a large majority of crops. During last autumn the writer had an interesting experience in testing the advisability of thinning out main crops of onions. There is little doubt that in the large majority of cases the onion is one of those crops often thinned to excess. Many growers have formed an idea that it is essential for the plants to grow in single rows, as in the case of most roots; but it has been proved over and over again that if onions are allowed to develop side by side, a considerably heavier crop is produced than when the object is to attain considerably less roots of greater individual size. This may be seen from the following facts:—From three square rods 7 cwt. 21lb. of well-matured bulbs were secured, while, where excessive thinning was performed on similarly prepared ground, only a little more than half that quantity was produced. Needless to say, the soil in which the plants were growing was deeply trenched and heavily manured.

A common sight in some parts of the country, where dilatory farming is in vogue, is to see the drags put through a field of turnips as an apology for thinning, and in some cases it is surprising to what dimensions roots attain when so treated. This, however, is not a practice to be recommended; yet it may be of use in demonstrating the fact that, if a heavy yield of roots is required, it is by no means essential to allow the plants an undue amount of space. The craze for exhibition-roots has led to over-thinning in many instances; but even should these larger roots equal in yield the smaller-sized roots, the latter are vastly superior as regards quality.—SOUTHRON, in *Farm and Home.*

**Wastage of Farmyard Manure.**—In the present unprecedented conditions, when there is an upward tendency in the cost of artificial manures, owing in great measure to the enormous increase of freights, and with the potash supplies practically cut off, it seems opportune to draw attention again to the wastage of farmyard manure, and what this wastage means in crop production.

So much has already been written on the chemical composition of the manure, the losses which it undergoes in its making and storage, and the means for preventing them, that further repetition is unnecessary. There are, however, some aspects of this question which at the present juncture will bear reconsideration with profit. The efficient use of farmyard manure necessitates in the first place an understanding of the properties which endow the manure with its remarkable fertilising powers; in the second place, a recognition that its value, apart from its origin, will depend to a great extent upon the taking of reasonable precautions against losses in the making and storage of the manure, and, lastly, upon the time and method of its application to the land. The importance of the nitrogen content is shown in the following figures, which are the average results of the application of manure, containing different amounts of nitrogen, to potatoes at the rate of 20 tons per acre respectively:—

| | MANURE. | | POTATOES. | |
|---|---|---|---|---|
| | Nitrogen per cent. | Supplying Nitrogen per acre. lb. | Increased Yield per acre. lb. | Percentage increase over the manured land. |
| No. 1 | ·359 | 161 | 7476 | 38·6 |
| No. 2 | ·347 | 155 | 6832 | 34·8 |
| No. 3 | ·301 | 134 | 4844 | 24·9 |

These differences in yield of potatoes, when expressed in terms of human food requirements, provide striking figures, as shown below. The basis of conversion is that adopted by Professor Middleton in a paper read at the British Association meeting at Manchester, in which he allows ¼lb. digestible protein and 3,500 heat calories to maintain an average man comfortably for one day.

| | Potatoes. | Number of days. | Ration for one man |
|---|---|---|---|
| | lbs. | Protein. | Energy value. |
| No. 1 | 7476 | 567 | 885 |
| No. 2 | 6832 | 518 | 803 |
| No. 3 | 4844 | 367 | 573 |

Nos. 1 and 2 manures contain respectively 20 and 15 per cent. of nitrogen more than No. 3. Now, it is well known that in the making and storage of farmyard manure the nitrogen is the constituent which suffers greatest loss, amounting in some cases to 50 per cent. or even more of the total nitrogen originally present, and producing sometimes much larger differences between the chemical composition of the fresh and rotted manures than is shown in the manures here referred to. Other factors require to be borne in mind also, but by way of illustration the figures quoted emphasise the fact that, where avoidable losses of manurial constituents in farmyard manure are taking place, the result is to diminish appreciably the resources of the farm for producing food material, either in the form of crops or indirectly of meat and milk products.

The liquid manure is the channel through which the principal wastage occurs. It contains over 80 per cent. of the most valuable manurial constituent of animal excreta, the remainder is contained in the fæces. This liquid manure is of special importance at the present time, because of the soluble potash salts which it contains in addition to compounds of nitrogen. On an average, 300 gallons of liquid manure will contain as much potash as 1 cwt. of kainit, and it can be applied with advantage to most crops.

The wastage of farmyard manure, however, is not confined to the steading or the manure heap, as the following data will show.

Fresh manure at the rate of 20 tons per acre in each case was applied:—No. 1, broadcast to the stubble in the autumn, and ploughed in; No. 2, stored in a heap in the autumn until the spring, and the residue applied in drills; No. 3, fresh manure applied in drills in spring, for potatoes, and with the following average results:

POTATOES.

| | Increased yield per acre due to manure. Tons. | Cwts. | Percentage. |
|---|---|---|---|
| No. 1 | 2 | 2 | 127 |
| No. 2 | 4 | 2 | 150 |
| No. 3 | 5 | 15 | 164 |
| Yield of unmanured land | | | 100 |

The fresh manure stored in a heap in the field lost about 28 per cent. of its total nitrogen, and the shrinkage of the total weight of the heap amounted to 20 per cent., so that only 16 tons of rotted manure were available in the spring. But, notwithstanding these losses during storage, the increased yield of potatoes from the rotted manure was about double that produced by the fresh manure applied broadcast in the autumn, though it was considerably less than the fresh manure applied in the drills in spring at the same time as the rotted manure. Hence it follows that the most efficient method of those under consideration for utilising farmyard manure is to store the fresh manure in a heap during the winter for spring application.

Against this practice is the problem of securing sufficient labour in the busy spring months, likewise the objection to the drying effect of the spring application on the lighter soils, compared with the opposite effect produced by the autumn application. However, storing manure in the autumn or winter, either in or adjacent to the field where it is required, would relieve the pressure of work in the spring to some extent, and the other objection would only apply in a dry spring.

Farmyard manure is not a well-balanced manure, and the addition of suitable artificial manures for some crops makes a more efficient combination in ordinary times at less cost, as the following average results show :—

| Manures per acre. | Increased yield per acre. | |
|---|---|---|
| | Potatoes. | Turnips. |
| 20 tons farmyard manure .. | 169 .. | 146 |
| 10 tons farmyard manure .. | 140 .. | 140 |
| 10 tons artificials* .. .. | 168 .. | 158 |
| Yield of unmanured plot .. | 100 | |

The artificial manures used can replace 10 tons of fresh farmyard manure applied in drills in spring for potatoes, and they are more than equal to the 10 tons of manure in the case of turnips. These results were obtained on a medium loam soil at the Experiment Station of the West of Scotland Agricultural College. On the other hand, by increasing the quantity of farmyard manure usually applied, it will help to a considerable extent in making good the present deficiency in the supply of potash manures.—Prof. BERRY in *The Scottish Farmer.*

**The Right Kind of Lime.**—In liming the soil, the question of solubility must be considered. Only the comparatively small particles of limestone go into solution readily enough to produce immediate results. The material used must, therefore, contain enough dust to produce the desired result. Residual coarser particles will doubtless do some good, but they cannot be counted upon for immediate effects. A soil that is acid enough to require 1,000lbs. of carbonate of lime to neutralise the ploughed surface of one acre—and this is not an extreme case by any means—must have at least 1,000lbs. an acre of fine limestone dust to render it even neutral, and a larger amount to render it basic in reaction and really suitable for the growth of legumes. It is generally believed that chemical methods underestimate the real acidity of the soil, and that more lime must be applied than is indicated. In the above instance, however, it is evident that about 1,600lbs. of the limestone dust or about 7,000lbs. of the quarter-inch screenings would be required to supply the requisite amount of available lime. These estimates are based upon everything passing through the forty-mesh sieve. This, of course, is merely an empirical estimate, but it has the advantage of squaring up well with the results of field experience.

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* *Artificials per acre*—Potatoes—4 cwt. superphosphate, 1½ cwt. sulphate potash, 1 cwt. sulphate of ammonia. Turnips—4 cwt. superphosphate and ½ cwt. sulphate of ammonia.

Small applications of screenings are rarely satisfactory. The acidity of the soil is not neutralised, it is simply decreased, even though numerous small lumps of limestone remain in the soil. A farmer ploughed in 2 tons to the acre of limestone screenings, with no apparent good effects. Two years later it was easily possible to find small pieces of limestone at the bottoms of the furrows, but tests showed that the soil near where these particles lay was acid to litmus paper. In another case a farmer was advised to apply 2 tons to the acre of ground limestone, but not understanding the difference between limestone screenings and finely ground limestone, he applied the former and got no results. Later he applied to another part of the field 2 tons to the acre of finely ground limestone, with the best of results. The sole reason for the failure of the screenings in both these cases lay in the small amount of fine dust applied and the comparatively slow solubility of the coarser particles. In the cases just cited, the soils were rather closely grained silt loams with but little organic matter in them. Doubtless better results might be secured in the case of open, sandy soils, in which the limestone would dissolve somewhat more readily.

A large application of screenings will outlast a smaller application of finely ground limestone, but there is room for debate as to which is the more economical. Advantage may be claimed for the screenings in that a single application lasts longer, and the same land does not have to be gone over again so soon, and that there is a larger excess of lime carbonate in the soil for a time after liming, which is very beneficial to certain crops. Furthermore, the first cost of materials is much less. On the other hand it must be borne in mind that the labour cost of handling the necessarily large amount of material is quite an item, particularly in the case of long hauls, and the excess of undecomposed lime carbonate in the soil is subject to heavy losses by leaching, so that a considerable amount of it leaches out without doing any good. Limestone applied in the presence of soil acidity combines with acids, but limestone that is lying in the soil waiting for acidity to develop may get washed away before any need of it arises. This condition makes it plainly unwise to apply any very large excess of the relatively soluble finely ground limestone, and throws some doubt on the advisability of liming with any kind of lime very much in advance of the immediate needs of the soil.

However, important as it may be to know something about the various kinds and grades of lime and limestone in order to get the desired results most economically, the main thing to bear in mind in the case of acid soils is that any kind of lime—burned lime, slaked lime, limestone screenings, limestone dust, marl, or shells—is much better than no lime at all. Application of lime to soils deficient in it means fewer failures and bigger yields of clover, which, in turn, if wisely utilised, mean more nitrogen and organic matter in the soil and larger yields of all other crops in the rotation.—*Country Gentleman.*

**Ripening Cream.**—The lactic fermentation, or the souring and ripening of cream, is brought about by a specific organism known as bacillus acidi lactici, since the production of lactic acid in cream and milk is dependent upon the life activity of this organism. It was about the year 1857 that Pasteur, the eminent bacteriologist, discovered and isolated the above-named organism, which he proved to be the essential cause of the souring, or lactic acidification, of milk and cream. As the ripening of cream is of so much value to the buttermaker, a knowledge of the character of the ripening bacteria is desirable, in order that the souring of cream may be regulated with some accuracy. The various species of bacteria frequently found in cream may be classed under two headings. One is of the species termed aerobic, as the presence of air is necessary in order that this type of germ may live and develop. To this class the lactic acid producing organism belongs, both air and warmth being necessary for the germs to thrive and perform their functions, so beneficial to the buttermaker. The other class of bacteria are termed anaerobic, as they are able to carry on their work only when deprived of oxygen. To this class belong the species of bacteria which produce butyric fermentation, and turn cream and butter rancid.

As a means of ensuring the successful ripening of cream, it has to be kept at a moderate temperature ranging between 60 to 68 deg. F. As air is necessary for this class of organism, frequent stirrings of the cream during the ripening period will further assist the ripening of the cream by admitting air to all parts of it. In addition to being of some assistance to the ripening organisms, the stirring will to some extent retard the activity of any of the anaerobic bacteria present. If through the cream being badly contaminated, not stirred, and kept at an unfavourable temperature, the butyric ferments get a hold on the constituents of the cream they will crowd out the lactic acid bacteria ; but, on the other hand, if the lactic acid bacteria once strongly develop, they very soon diminish the activity of the butyric ones. By having pure cream in the first place to deal with, then inoculating it with some of the lactic acid organisms from a pure culture, or, in other words, an uncontaminated starter, and provided a suitable temperature is maintained, the cream will easily ripen with subsequent beneficial results. It is, however, inadvisable to leave cream unchurned when once it shows 0·56 per cent. of acidity, for this will increase, and if more than 0·6 per cent. is allowed to develop the good results of proper ripening will diminish or be lost.

Too much acidity in cream precipitates the casein ; then it is a difficult matter to make butter of a good colour and free from white specks of hardened casein. It is always worth while for the butter-maker to give very careful attention to the proper manipulation of the cream previous to churning, as unless the cream is in good condition the butter made from it cannot be all that is to be desired as regards quality. At dairies where the cream is churned at various irregular intervals, and no attention given to the ripening, the butter will sometimes be tainted, or "off" in flavour, even if at other times of a prime flavour. Under certain satisfactory conditions cream will ripen naturally, and if it happens to be churned when the correct proportion of acidity is present all will be well. A very important point in making butter for market is to have it of a uniform quality at all times, and this can only be attained by carefully managing the cream, which cannot be said to be a difficult matter.—" LAITIER" in *Farmer and Stockbreeder.*

**Perfect Butter.**—What variations there are in butter, and how many the causes which contribute to these variations ! There is nothing to equal butter made from Jerseys or Guernseys, but, on the other hand, quite a nice butter can be made from the milk of other herds. Colour is not everything, sweetness and freedom from taints are most important, and these can only be secured by cleanliness.

Everything that has contained milk should first be washed perfectly clean in lukewarm water, as if first washed in hot water the albumen present in the milk congeals or solidifies, and is then difficult to dislodge from the crevices. A final washing or scalding in boiling water removes any objectionable germs which may be present, and also causes the metal to dry off quickly. The wiping out of milk pails with cloths is not to be advocated, as too frequently these are none too sweet, nor sufficiently free from germ life. When tin pails are left with splashes of milk in them, or are badly washed, rust secures a hold, owing to the acid in the milk eating into the metal. I have seen this specially noticeable in cheese vats which have not been well looked after, and in consequence constantly require re-tinning. The pail, being less expensive, is allowed to go on rusting, and is usually thrown away. After scalding, all metal utensils should be placed on a rack, cans being drained by inverting them, and if placed in the open air so much the better. Cream is too often neglected, being left in the cream crock unstirred until used for churning. The correct thing to do is to keep each lot of cream stirred at intervals say three times a day—once each morning and evening when new cream is added, and once during the middle of the day. Under no circumstances should any fresh cream be added for twelve hours before churning takes place. Keep the crock containing the cream in a temperature of about 60 to 65 deg. Fahr., so as to promote acidity. Continuous practice in tasting the cream before churning will, if careful observations are made, finally result in the buttermaker knowing just when the correct amount of acidity is reached. The thicker the cream and the lower the temperature, the slower it will ripen; while the thinner it is, and the higher the temperature, the quicker will it become acid. Always keep the crock covered with a piece of butter muslin slightly moistened.

It is quite a different matter churning in summer time, as compared with winter. In the summer the cream has to be cooled down to the required temperature, while in winter it has to be heated up to the given temperature.

Whenever cooling or heating is performed, it is best done by immersing the pail in water; but if the cream is thick, water not hotter than 80 deg. Fahr. may be added. The churn should be prepared by first scalding and then rinsing with either cold or lukewarm water, according to the season and temperature of the dairy. A similar treatment must be given to the butter-worker, Scotch hands, butter-board, or any other wooden utensils that are to be used in the making up of the butter. If this is not done, the butter will stick to the wood, as also will the cream when placed in the churn. Churning must proceed slowly at first, accompanied by frequent ventilation through the medium of the air valve in the lid. Practice soon makes the churner familiar with the different sound and "feel" of the churn as the cream within it passes through various stages. When, finally, the butter grains commence to separate from the buttermilk, a little breaking water should be put into the churn in the proportion of one quart to each gallon of cream, after which churning is continued slowly until the butter-grains become about the size of mustard seed or small wheat grains. The complete separation of the butter-milk is most essential, for when this does not take place rancidity is set up sooner or later.

After first drawing off the buttermilk and giving a good rinsing with pure, clean water, a brine containing from 1 to 2 lbs. salt to a gallon of water should be added.

Brine has a hardening effect on the butter grains; therefore, in hot weather they should be left in the brine for as long as twenty minutes in order to harden. If it is preferred to dry-salt the butter, which practice is more economical of salt, it is usual to give from one-eighth to half an ounce of salt to every pound of butter, according to taste. Always allow the salt time to dissolve gradually into the butter.

Many a good grain has been spoiled in working, and this fault is indicated when the finished article is broken. Then, instead of the fracture presenting a nice, even, round, and firm grain, it is plastic. The beginner is too often inclined to use the roller of the butter-worker much after the fashion of a child with a new toy; whereas each time the roller passes over the butter some useful purpose must be fulfilled. Also the water must be given some time to drain, after which all surplus moisture on the worker should be taken up with a moist cloth.

Where it is necessary, as in private establishments, to send butter away by post, it should be made into regular blocks, which admit of correct packing. Half pounds and pounds are the most usual sizes, and the oblong brick shape made by the Scotch hands is to be preferred, with just a neat, simple print on top.

When it has to be packed, always allow the butter to harden before wrapping in grease-proof papers. The latter can be had in all quantities, and cut to the required size, also folding butter-cases for ½lb. or for 1lb. blocks, and substantial 1lb. boxes for posting. Too frequently butter is sent away badly packed in any kind of old box. This might have been excusable years ago, but at the present time there is no excuse for bad and careless packing, for the requisite materials are cheap and easy to use.

After the butter has been made up and placed in a cold room, attention must be given to the churn and utensils. The churn must be given a thorough washing with warm water in order to remove grease. This should be followed by a good scalding. Finally, add a pail of boiling water, replace and secure the lid, and revolve a few times. After draining off this water leave the barrel upside down to dry. The object of using boiling water and not cold is that the wood will dry more quickly. Thus all that is necessary when again using the churn is to soak it and scrub it with a little salt. The butter-worker and wooden utensils should receive like attention. A good butter-maker is always known by the neatness of her dairy, and the manner in which the utensils are cared for.—" AGROSTIS," in *Mark Lane Express.*

**Hints on Chicken Rearing.**—It is not a difficult matter to produce chickens from eggs in the spring and summer, neither is it a difficult matter to rear the chickens; nevertheless, the mortality in the poultry yards and farms throughout the United Kingdom reaches each year an enormous figure, which, being unrecorded, is too little considered. We are all economists nowadays, and it is worth while to consider how best to keep the death-rate in the chicken-yard down.

The first point to bear in mind is the importance of healthy stock. Here the farmer has the advantage over the man with limited space. It is, of course, perfectly easy to get healthy chickens from stock penned in wire runs; but, after all, there is nothing like liberty for fowls—the liberty fowls on a farmstead enjoy. What we seek are chickens that are out of the shell on the nineteenth and twentieth day; such chicks mean healthy stock. Set your eggs fresh, and select the eggs from virile parent birds, and then the chicken has a good start in life.

Some people forget the need of choosing a suitable site for the coops or foster mothers; chickens cannot stand cold winds in their early days, and unless well protected from them will droop and die. When the death-rate is big it is a common thing to blame the weather, and, of course, our variable climate renders the explanation plausible; but our seasons are regular in their variability, and due precautions should be taken to protect the chickens. Give them weather-proof coops, placed in a sheltered situation, so arranging each coop that the inmates get all the sun possible, thus weather can be more or less defied. A spell of cold east winds will certainly retard the growth of chickens, but it will not kill them, neither will wet, if they are adequately protected against climatic conditions. I refer especially to early chickens. When we get a dry warm summer a converted soap or sugar box will be sufficient for the brood. Unfortunately, we cannot reckon with any confidence on warm dry summers, and if we try to economise in housing accommodation for chickens we are likely to lose a good many young birds. It is the wisest economy to protect them as much as possible; a well-made coop or foster mother will last many seasons.

On the question of feeding many elaborate and long articles have been written, yet, curiously enough, poultry-keepers who defy all the advice in them sometimes do excellently. I have seen splendid chickens in Sussex reared from the shell on ground oats mixed to a porridge with water; these birds had never had a grain of corn given them. I have also seen fine healthy chickens reared on dry grain and nothing else. These are the two extremes. The majority of chicken rearers rear on a mixed diet of soft food and grain, and on the whole this is best. Before the question of feeding is left, the importance of one point must be emphasised: chickens need feeding early in the morning. There are places, but not often farms, where eight o'clock is thought quite early enough for the chickens' first meal. If chickens are free to range with the mother hens it does not matter so much; but in most cases, owing to the danger from rats and foxes, chickens are shut up at night and only released for their first meal. This should be given not later than six o'clock in summer, and earlier is better. Never stint growing chickens: they should have all the food they can eat: if they have to go hungry for long their growth is affected.

Rats have just been mentioned. It would be interesting to know how many thousand chickens and ducklings are killed by rats every year. It seems impossible to exterminate rats, but it is possible to protect chickens against them. Coops, if unboarded, should have wire netting underneath them. This should not be nailed on, but laid on the ground, the coop should stand on it, and the corners of the netting be turned up all round. The mesh should, of course, be close enough to baffle the rat. Systematic war by means of trapping, ferrets, poison, &c., should be waged against rats. A fox-terrier is often a treasure in this matter, and one has heard of cats that kill rats and don't touch the chickens; such feline treasures, arealas! rare.

Never attempt to rear chickens along with adult fowls; pullets should never run with older hens till full grown, or they will never attain their full growth; neither should very young chickens be run with those a little older. Two broods, one of a week, one of two weeks, should not be amalgamated.

In dry weather chickens are prone to get lice. These pests are found under the root of the tail and under the wings; they kill many chickens and turkey poults annually. The chickens, while being kept scrupulously clean, should be looked over frequently to make sure they are free from these pests. If found, the birds should be dusted with insect powder.

The poultry owner should never forget that the best, healthiest chickens are hatched in March and April. They grow as the days grow, and attain the biggest size. Hatch stock birds in these months; earlier chickens can be killed for table, as they will be ready when prices are good.—C. D. Leslie in *Live Stock Journal Almanac.*

**Testing Eggs.**—Although there have been many theories expounded from time to time regarding the method of determining whether an egg is fertile or infertile before the period of incubation has commenced, none, so far as I am aware, has ever proved successful when put into practice. Among all the many theories I have heard there was only one which seemed to possess any semblance of truth. An old Irish poultry-keeper, who had all her life been interested in fowls, stated that after many years of practice she had discovered a way of determining whether a new-laid egg was fertile or not. She placed the broad end of the egg in her mouth, enclosing it with her lips, and gently breathed upon it. If it contained a germ heat was given off, while if it remained quite cold it was sterile. There seems commonsense in this, since where there is life there must be warmth, and after an exhaustive test all the eggs she stated to be fertile proved to be so. Unfortunately, those eggs she rejected were not incubated, and thus the exact measure of her success cannot be gauged. I must confess that whenever I have made the test the failures have been as frequent as the successes.

While there is no other means of determining whether an egg is fertile or not before incubation has begun, we are able definitely to determine this point on the seventh day after hatching has commenced. It is quite possible for an expert to tell this on the third or fourth day, but it is risky to reject an egg at so early a stage. For practical purposes the sixth or seventh day is the best. There are several advantages to be derived from testing eggs at the end of the first week of incubation. The process must be performed very carefully indeed, since any roughness in handling cannot fail to have an injurious effect. The infertile eggs may be put to several uses. After a new-laid egg has been in an incubator or under a hen for a week, it is still considerably fresher than those eggs that are termed "cookers," and it is, moreover, fresher than many of the so-called new laids offered for sale in the retail shops. Another use to which infertile eggs may be put is for feeding young chickens, if they are being reared under the moist and not under the dry system. The eggs should be boiled hard, mixed with biscuit meal, and moistened with milk. Another advantage of testing is that by this means space is greatly economised. Suppose, for instance, four hens are set on the same day (a good plan to adopt whenever possible), and at the end of the first week two or three eggs under each hen are sterile, the remaining fertile ones can be concentrated under three hens, thus liberating the fourth, which may be immediately re-set. This is a more important point than many imagine, because early in the season, when broody hens are extremely scarce, to save the labour of a sitting hen for a fortnight is no small consideration. In a similar manner with an incubator valuable space can be saved by removing those eggs that are infertile and refilling with fresh ones. The disadvantage of this is that chickens hatch at different times; but this difficulty can to some extent be overcome by dividing the egg drawer with a piece of wood or some stout cardboard.

Another test for fertility can be made on the nineteenth day. As a matter of fact, this is not of much service so far as determining whether an egg is fertile or not, since on the nineteenth day it is little use knowing this fact. The eggs are placed in a basin of water heated to about 100 deg., and allowed to remain therein for about half a minute. The eggs containing dead chickens sink to the bottom, while those containing live chickens float about on the top. If they are watched carefully they will be seen to jump about, owing to the movements of the chickens within. This is not of much value as a test, but it serves another very useful purpose. It has the excellent effect of softening the inner and outer membranes—the two thin skins adhering to the shell—thus making the exit of the chicken more easy.

The easiest method of determining the age of an egg is by the process known as "candling," and many of the large London dairies test all the eggs they dispose of in this manner. The egg is held up before a lighted candle or a lamp in a dark room, and the air-space, situated at the broad end, is examined. By its size and position the age of the egg can be determined. In a new-laid egg the air space is quite small, and gradually increases in size as its age increases. It is possible to become exceedingly expert in determining the age of an egg by this test, an experienced person being able to tell to within about twenty-four hours. The process is, moreover, a very quick one, as a large number of eggs can be handled in a few hours. By the appearance of the shell the age can be determined to some, though not to a very great, extent. Upon the shell of a new-laid egg there is a bloom, just as there is upon a grape, which quickly disappears as age increases, until at the end of a few days the shell becomes dull. The age of an egg can be told by its density, which decreases as it gets older. Four ounces of common salt should be dissolved in 1¾ pints of water. Into this preparation the egg should be placed, and if it is new-laid it immediately sinks to the bottom; an egg three days old is suspended in the liquid, while beyond this age it swims on the surface. The older it becomes the more it rises out of the brine. An American method is as follows:—If the egg is placed in a saturated solution of common salt it will show an increasing inclination to float with the long axis vertical. A scale is attached to the vessel containing the salt solution, so that the horizontal can be measured. In this manner the age can be determined almost to a day. A fresh egg lies in a horizontal position at the bottom of the vessel; an egg from three to five days old shows an elevation of the broad end, so that its long axis forms an angle of 20 deg. With an egg eight days old the angle increases to 45 deg., with one fourteen days old to 60 deg., with one three weeks old to 75 deg., while an egg a month old floats vertically upon the pointed end.—E. T. Brown in *Farm and Home.*

**Ducks in Winter.**—When the conditions are favourable there is no branch of poultry-keeping which yields a greater profit than the rearing of ducklings, for the early spring market. Even if one does not actually hatch the eggs oneself it pays excellently to produce them, since during December, January and February very high prices are obtainable. There is seldom any difficulty at all in procuring 10s. 6d. and 12s. per dozen, for eggs from ordinary utility stock not from show specimens, and 14s. or 15s. during severe weather, when eggs are particularly scarce. These prices are possible, seeing that the finished article realises so high a figure. Among other advantages may be mentioned the ease with which ducklings may be reared, the rapid rate at which they develop, and the small amount of space which is necessary to carry on the work.

Of the four principal varieties of ducks the Aylesbury is far and away the most suitable for supplying the market with early ducklings, It is true that its flesh is not, perhaps, of quite so fine a flavour as some of the other breeds, but this drawback is more than compensated by its remarkably rapid development. Thousands of Aylesburys are marketed every spring, weighing from 4½lb. to 5½lb. when only eight weeks old. No other breed approaches it in this respect; the Pekin takes at least ten weeks to attain this weight and the Rouen fully three months. The Indian Runner is a quick grower, but it is too small a variety to be of any service for marketing purposes. Its chief value lies in its extraordinarily prolific powers. The enormous advantage of this rapid development on the part of the Aylesbury need not be emphasised, since it must be apparent to everyone who thinks the matter out. It is no exaggeration to say that early in the season, when prices have reached their highest point, or are even on the decline, it may mean that 3s. or 4s. per couple more may be secured.

The Aylesbury is a fairly good layer, and provided that the ducklings are hatched at the right time in Spring a large portion of the eggs are produced during the winter months.

If large and rapidly maturing ducklings are wanted—and I think we may presume they are—then the parents should be chosen with these points in view. Big ducklings will never be produced from undersized parents; healthy ones will never be produced from unhealthy parents; and quickly growing ducklings will never be produced from ducks which themselves were slow developers. "Like produces like" is a law of nature, the importance of which should never be overlooked.

It is a mistake to mate too many ducks with one drake, for if this is done the bulk of the eggs are likely to be infertile. At the beginning of the breeding season three to one is quite a big enough proportion. As the season advances the number may be increased, until towards the end of the spring five ducks to one drake is not too many. During the early part of the breeding season a set, as it is called in the duckling centres, consisting of ten ducks and three drakes, forms a very convenient breeding pen.

Young ducks and young drakes should not be mated together if it can be avoided, for the stock they throw are not likely to be very satisfactory. If the drake is in his first year he should be mated with ducks in their second season. If he is two years old he should be run with yearling ducks.

In the morning the birds should receive a meal of warm mash, while grain, if such be employed, should be supplied in the afternoon. A good preparation for the mash consists of the following:—Three parts barley meal, two middlings, one bran, one pea meal, and every alternate morning half a part of meat. During very cold weather, half a part of maize meal has a beneficial effect. On warm days the proportion of bran may be increased, and one part brewer's grains added to the mixture. Personally, I prefer to feed stock ducks upon mash altogether, in which case the morning preparation would be repeated. Many breeders, however, prefer to use grain in the afternoon, and when such a plan is followed, wheat and oats are the most suitable. Stock ducks should be lean, with hard and firm flesh.

Two meals daily have been found sufficient, for ducks are food foragers, and when they have access to a stream or pond—as breeding ducks always should have—they are able to procure a large proportion of their own food. The more natural food the birds can obtain the better, since upon such foods not only do they thrive better, but the food bill—the bane of many a poultry-keeper's otherwise happy existence—is greatly reduced. Especially is this a matter of very great importance at the present time, when all feeding stuffs are so dear. At mid-day some green food should be given, any surplus garden produce answering well. Grit and an abundance of fresh drinking water are very necessary items to the diet

Because ducks are hardy birds it does not follow that they can be neglected so far as housing arrangements are concerned. As a matter of fact, no class of poultry responds more readily to good treatment than do ducks. It naturally follows that if they are unsuitably housed, if the place is damp, ill-ventilated, or cold, the results are almost certain to be unsatisfactory. It is far better to keep no ducks at all than to keep them badly. It will certainly prove more profitable, for under such conditions money will inevitably be lost.

It is quite unnecessary to have a high house, since ducks sleep on the ground. One which is 4ft. 6in. high in front, sloping down a foot or so towards the back, answers the purpose admirably. The ground itself should form the floor, for wood, cement and bricks are all unsuitable. If the place around the house is at all damp, the earth inside the shed should be dug out to the depth of 5in. or 6in. and refilled with coarse gravel or broken bricks, the earth which was removed being replaced. This makes the floor 5in. or 6in. higher than the surrounding land and ensures absolute dryness. An abundance of pure fresh air is a very important factor towards health. A stuffy house nearly always causes trouble of one sort or another. It is an excellent plan to have the front made of wire netting with a wooden shutter, which can be opened or closed at will. There should also be some holes pierced at the highest part of the two ends, so that even when the shutter is closed the interior is well ventilated.

Around the house there should be a small run, in which the birds should be kept every morning until about 10 or 10.30 a.m. Ducks are very prone to lay in the water, in which case the eggs are generally lost or broken. But as ducks almost invariably lay early in the day if they are confined till about 10 the eggs are saved. There is another advantage in the small run, and that is that the birds can be fed within it about 4 or 4.30 p.m., the door closed, and they are thus safe for the night. This saves all the bother of driving them off the water when it is time for them to be shut up for the night, sometimes a very difficult task.—"POULTRYMAN" in *Agricultural Gazette.*

**Goose Breeding.**—Geese seem to be getting more popular. They differ from all other poultry in that they can live on grass and roots alone, and except for the trouble of rearing and looking after the sitting geese, they require practically no attention. It then becomes a question of whether they pay for the grazing as well as cattle. At about 1s. per lb. they certainly do, because they mature in so little time. It is said that three geese graze as much as a sheep, and this may be true as regards the older ones. Most goslings are hatched in April, and for some months cannot eat as much grass as old ones. Even if run on to Christmas in the old-fashioned way, they cannot fail to pay if they realise 10s. to 15s. each. They are capital stubblers, are easy to drive to the fields, and will often stay there until evening. Many are kept in America, and their owners write most enthusiastically of the profits to be derived from them. They are usually marketed as green geese, reared up to about fourteen weeks old, and then fed heavily with grain for a fortnight. Older goslings will bear from three to four weeks' fattening, but as soon as ripe should be disposed of, for they subsequently fall off, as, do all kinds of fatted poultry.

Some dealers buy flocks of Irish geese, shut them up in sheds on straw, and fatten for three weeks, chiefly on boiled maize. There is no hardier domestic bird than the goose, and it rarely ails from any cause. It will eat the roughest of green food, and will thrive on bog and marsh when nothing else could. There are parts of England where the cottagers keep them largely on common land. I have met with such places in Worcestershire and Hertfordshire. Geese will thrive on poor land such as the lower slopes of mountains, but they do better on a marsh. It is not advisable to keep them on rich grazing pastures watered by ponds as they dirty the water, making it unfit for cattle to drink. It is questionable to what extent they pay for corn. The stock geese must be fairly well kept during the laying season to ensure plenty of eggs, but the rest of the year they may rough it.

The goslings will pay for corn until they have a good start, when one feed daily will be sufficient during the growing period, until they are shut up for fattening. Geese will always be stock rather for the small holder and the cottager than for the large farmer.

Far fewer are kept on farms of fair size than were fifty years ago. Formerly nearly every farm of from 50 to 300 acres had its one breeding set. I have never seen them answer well in confined spaces, such as on an orchard or paddock of an acre or so, although I have often seen it tried. The chief varieties are the Toulouse and the Embden, in each of which the full-sized gander will reach to 20 pounds and the geese to about two pounds less. In America the African geese are also common, attaining to about the same weights. In growing tests the pure African has taken leading place the oftenest, although the pure Toulouse and the Embden-Toulouse cross have at times beaten them.

The Chinese geese are smaller, ganders reaching to fourteen pounds and geese to twelve. These are to geese what the Indian Runners are to ducks, and are great layers, sometimes giving as many as ninety eggs in one season. For this reason they are sometimes kept, and if mated to an Embden gander will give a small marketable goose of good quality. Geese differ from other farm poultry in their longevity. As a rule they are not very successful as breeders in their first year, although young ganders may safely be mated with older geese. They will live to a great age, but are at their best for breeding from two to ten years old. The best rule is to keep a breeding set as long as they are profitable, and then clear right out and start again.

Old geese are apt to lay many double-yoked eggs. It is not advisable if one goose is lost to introduce a new one, as the old gander will rarely take to it. Two to three geese may be run to one gander, while in the case of Chinese four to five may be given. It often happens that a gander will mate with three geese successfully, yet has one special mate. In the common mixed geese of the country most of the young ganders are white, and nearly all the geese grey. Anyone going in for geese should get the breeding set together so that they have time to take to each other before the breeding season commences. The first eggs may be expected about the middle of February, although much depends upon the feeding and the exposure of the situation. As with all poultry, nitrogenous food should not be neglected, and many more eggs can be produced on a little fish meal and sharps once daily than on wheat, barley, and maize. Still, geese, as they are large vegetable feeders, work off the effects of starchy grain much more easily than other poultry.

As a breeding set will last many years, it certainly pays to have the best. Of the two large pure breeds I prefer the Embden. They are handsomer than the Toulouse, grow quicker, and mature more rapidly. They are fair layers often laying eighteen to twenty eggs in two lots. The geese are reliable sitters. The Toulouse lay more eggs—up to thirty in one season—but rarely go broody, and are not reliable sitters. When there is no prospect of selling pure stock the cross from the Embden gander and the Toulouse geese may be recommended. These usually get to greater weight in a given time than either of the pure breeds. The Embden gander is more active and usually the better sire, while the extra eggs from the Toulouse geese are an important asset.

Although geese have been hatched in incubators and reared by foster-mothers successfully, the common hen is usually used for incubating, and is considered better. Hens of the heavy breeds, Orpingtons do quite well, make the best mothers. They will cover about four to five goose eggs, the Toulouse eggs being usually rather smaller than the Embden's. It is as well to turn the eggs daily by hand, as one is not sure that all hens will move these large eggs sufficiently. The period of incubation is thirty days. It is preferable to make the nests on soil which can be slightly damped occasionally by pouring a little warm water into the corners so that it may work through the soil under the straw. Goslings often require a little help when hatching, but it must be carefully done and should not be attempted too soon.—George A. Palmer in *Farmer and Stockbreeder.*

# The Farmer's Library.

## NOTES AND REVIEWS OF NEW BOOKS.

### 1.—*History of the Central Chamber of Agriculture.* By A. H. H. Matthews. London: P. S. King & Son.

There can be but few farmers who have not heard of the Central Chamber of Agriculture, although probably many have only a faint idea of the service it renders to farmers generally. A statement that the conditions under which farming is carried on at the present day are largely due to the influence of the Chamber in the past would, to the majority of agriculturists, come as a great surprise; yet it is not going too far to say so.

If recent history has proved anything it is that only by combining can men hope to attain their objects. In fact, one might go further and say that unless men, interested in a particular pursuit do combine, their interests and even their just dues will receive but scant consideration. This is especially true with respect to the national legislature. It was so apparent in 1865, that it induced Mr. Chas. Clay to write to the agricultural Press and propose the formation of a "Central Chamber of Agriculture," whose duties should be to facilitate the passage through Parliament of any measure calculated to benefit agriculture, as well as to oppose or modify any proposals detrimental to that important interest. A meeting was held on 6th February, 1866, and the Central Chamber was formally established. Now, fifty years afterwards, the present secretary has written this interesting and valuable record of the work done during this eventful time.

What had partly prompted Mr. Clay to propose this Central Chamber was the desire to protect farmers against the losses caused by cattle diseases, and especially the Cattle Plague of 1865–66. The very first resolutions passed by the new body related to cattle diseases. From that day to this, one of the most important duties devolving upon the Chamber has been to safeguard farmers, so far as might be, against the ravages of such diseases, by inducing politicians to adopt measures to this end, and by checking or preventing panic legislation. How varied and important has been the work done in this direction by the Chamber is well shown by Mr. Matthews in his first chapter. It is not possible to read this record without forming many conclusions among which three stand out prominently, viz., how ignorant Parliament is of scientific facts; how slow men are to utilise knowledge; and, how prone they are to forget or forswear the past. In fact, despite its 50 years' work the Chamber has still an uphill task to perform, and is likely to have for many years to come, if it would protect the farmers, and ensure efficient legislation against the increasing ills, in the form of diseases, which our herds and crops are liable to.

Local taxation, Land tenure, Agricultural Education, and the Prevention of Fraud, are the four main divisions of the work which the Chamber has undertaken in the past. They will need constant attention in the future.

Minor subjects which have been dealt with are too numerous to mention, though to those interested in them they would have special importance. In fact, there seems no aspect of agriculture, no legitimate demand of farmers, no reasonable suggestion for the future benefit of those engaged in the industry, to which the Chamber has not, at some time or another, devoted attention. It has probably been the best and staunchest friend of agriculture for the past half century, not encroaching on the work of other associations, but quietly carrying out its own particular programme to the great advantage of those whose interests it had taken in hand.

Under these circumstances, one wonders why the Chamber has not a far larger number of members and of associated bodies. Evidently this thought was present to the mind of the author when, having finished his record, he takes the Introduction to it in hand, for he there says:—

> "In every industry there are many individuals who prefer to remain isolated. The percentage that will combine may be divided into the capable energetic workers, the apathetic and slow thinkers, who will follow their leaders, and the self-assertive individuals who will join anything which gives them a chance of bringing themselves into prominence. The percentage who will not join are the most ignorant, or lazy of their group. Some of these may refrain from dislike of publicity, while some, being themselves incapable, are jealous of others who are able to understand questions of moment and to take a lead. The selfish men will say: 'There are plenty of others to do the work,' but these are ready enough to share any

benefits that may accrue from such work. There are others who, though incapable of seeing the advantages to be gained by political activity, will appreciate and respond to tangible benefits. In abnormal times, whether caused by threatened or actual attacks from other groups, or by a wave of political feeling, many of those who remain outside the organised ranks will join for a short period, but they soon drop out, and can never be relied upon. These features are not peculiar to the agricultural community only, though probably the followers of that industry are, owing chiefly to the isolated lives they lead, more difficult to organise than any other. At first sight this might seem sufficiently disheartening to prevent the expenditure of energy in any effort to bring them together, but it is a drawback by no means fatal to success, for the unorganised, however numerous, are practically voiceless. Let their feelings be ever so much aroused, they have no leaders, no concentration, no trust in each other, and probably no speakers with knowledge of the matter of the moment. The organised, therefore, even if the weaker, can superimpose their desires upon the whole industry. Notwithstanding this power, it will be found throughout this history that demands made by the Chamber have not been put forward selfishly, but that legislation asked for has been for the general welfare of agriculture, while nothing has been urged that would be inequitable to other sections of the community.

"The following pages will show that the Chambers have met with a gratifying measure of success, and have thoroughly justified their existence. The question is often asked: 'What have the Chambers done?' This book gives the answer.

"It is not claimed that all, or even most of the results recorded here are entirely due to action taken by the Chambers. It is very seldom that any end can be attributed to the influence and efforts of this or that Society: as a rule, many factors are requisite to bring about satisfactory results. The Chambers, however, have no cause to feel ashamed of their record. Rather may they point to it with pride, and as cause for greater confidence and fuller support from their fellow agriculturists in the future."

We cannot help feeling that farmers must do more than merely point to the good work of the Chambers in the past. There is work still to be done in which everyone can help. It is only necessary to read this book to realise how much is still left incomplete, and those who would join the ranks of workers in the good cause of agriculture will do well to first study this history, for history is the best guide to future action.

Mr. Chas. Bathurst, M.P., one of the best friends agriculture has, as President of the Chamber, contributes an interesting Preface to the book. He writes from intimate knowledge of the work of the Chamber during recent years, for few men have taken a more active part in this work than he has. From that Preface we select two passages, which are in our opinion neither too high praise of Mr. Matthews' History, nor the expression of too great a hope for the future of agriculture.

> "The history of the Central and Associated Chambers of Agriculture is, in effect, the political history of British farming. As such, this volume, so ably compiled by the present Secretary of the Central Chamber in the fiftieth year of its existence, deserves to be carefully perused, and thereafter kept as an invaluable book of reference by everyone who claims to be in any sense an Agriculturist.
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> "Courageously and clearly expressed, it is the record of the indefatigable labours of courageous men belonging to both political parties in the State, united in the prosecution of a common and patriotic aim. These men have been inspired by the sincere conviction that upon the well-being of Great Britain's oldest industry depend the ultimate economic welfare of her people, their physical and mental virility, and that healthy outlook upon national problems which alone can maintain her pre-eminent position among the nations of the world. Braced by this inspiration, they have fearlessly and persistently voiced the true needs of Agriculture.
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> "What is in store for British Agriculture in the future no one can prophesy with any confidence. The Great European War may—and God grant that it will—cause the nation at large to realise the wisdom, and the ultimate economy, if not the necessity of making Britain more self-contained in the matter of food production for her teeming population. Definite encouragement, fair treatment, and official recognition will then, it is hoped, be extended by Government to those, whether landowners, yeomen, or tenant farmers, who carry out to the best of their ability and resources this eminently patriotic duty. Pending such time, however, the loyal cohesion of agriculturists of all classes for the protection of themselves, and their industry, is more than ever essential. In this task the Central Chamber

will welcome the assistance of other and younger organisations formed for a like purpose, and they on their part, will, without doubt, recognise the immense debt of gratitude which British Agriculture owes to the pioneer work of the great organisation which fifty years ago embarked upon the fruitful and epoch-making activities of which the following pages are so faithful a record."

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### 2.—*Food Economy in War Time.* By T. B. Wood and F. G. Hopkins. Cambridge University Press. 6d.

Of the many pamphlets which have been brought forth by the war, this is one of the most useful. The authors are the well-known professors of Agriculture and Biochemistry at Cambridge. We may thus rely upon the accuracy of the facts in which this pamphlet abounds.

In a general, half-hazy way, people are gradually beginning to realise that economy in the feeding of the nation is necessary. Unfortunately very few seem to realise what this term " economy " means. In the minds of many, it is synonymous with " going without." But that is not the true meaning of the word. It is of course, one meaning, and in that sense applies to a great number of people who might do with less food, especially meat, without any danger to health. But the authors truly say, "a proportion of the population, probably not less than a quarter of the whole, is already limited by the smallness of its earnings to the consumption of a minimum."

But there is another meaning to the term " economy," and that is a wise expenditure of money, and the chief value of this pamphlet lies in its showing how this can be accomplished. We take food not for pleasure, merely, but to serve a definite physiological purpose. " The body must burn fuel, in order that the heat which it is always giving off may be continuously replaced; and it must burn still more fuel whenever it does work." " The body must also undergo repair, and if it is to remain healthy, its repair must keep pace with the wear and tear which it daily suffers." For the production of heat, the constituents of food which are mainly called upon are fat, starch, and sugar. But these cannot repair the body or promote growth. " Nine-tenths of the solid matter of our flesh consist of protein, and in order to make flesh we must eat protein."

Most of the articles of food which we consume contain both protein and heat producers, but some few contain very little protein, and may be considered solely as heat producers. Nature is not particular as to which of these foods are used to supply her requirements, but man has to be because the cost of these foods varies. The authors have prepared most valuable tables showing how much of these constituents 1lb. of each kind of food supplies, and what the public are paying per lb., for each of such constituents in various articles of food. One example will be sufficient to show how greatly this varies. Thus 1lb. of protein costs, in lobster, 25s.; in salmon, 13s. 5d.; in tinned salmon, 6s. 4d.; in meat from 5s. to 7s.; in Cheddar cheese, 2s. 6d.; in milk, 2s. 4½d.; in dried beans, 9d.; in bread, 5½d.; and in oatmeal, 3d. In the same way we find that a definite heat-producing power, which costs in some quite ordinary foods 1s. or more, can be obtained in others for 2 or 3 pence, and in potatoes, for 1½d.

These figures are sufficient to indicate what an amount of economy is possible to those who possess this pamphlet and carefully study its contents. The sound common-sense which pervades the advice given, and the freedom from technical terms, enhance its value. As an illustration of the former, we cannot refrain from quoting the following:—

> "Those who reduce their consumption of food should, perhaps, be advised to lessen the amount of exercise taken for pleasure. This is a suggestion which will not be welcomed by the majority, but it should be understood that, with many, the need felt for constant exercise is in part due to the fact that the food eaten is in excess of what, without the exercise, would cover the needs of the body."

The necessity for economy, the true economy which this pamphlet would bring about, is serious. The authors consider that the wealthy and middle classes might " effect such a saving as would average 10 per cent. of the whole national expenditure upon food. This would amount to £60,000,000, and probably to more." "If a course of economy in food involves effort and discomfort, it should be the more welcome to those who do not otherwise share the much greater discomforts of active service."

3.—*Fungoid Diseases of Farm and Garden Crops.* By THOS. MILBURN and E. A. BESSEY. London: Longmans, Green and Co. 2s.

There are very few scientific subjects so difficult to explain in a popular manner as the nature of the Fungi. Dr. Milburn has made these lower members of the vegetable kingdom, a subject of scientific investigation for many years past, while, as lecturer on plant diseases at the Midland Agricultural College, he became intimately acquainted with the practical side of their study. What was perhaps even more important, his constant mixing with agriculturists and students taught him the difficulties of explaining this subject to those who had not a scientific training. He has also had the advantage of the advice and assistance of Dr. Bessey, Professor of Botany at Michigan, the celebrated United States plant pathologist. The author was limited in two directions. So numerous are the fungi and the diseases they produce that any attempt to describe them all would have meant a work "so bulky as to be almost useless." Hence it was necessary to limit the contents to the most frequently occurring diseases, and to treat these with as few technicalities as possible.

Although he has succeeded in this effort, yet even now the book will need careful study by those who wish to derive the fullest benefit therefrom.

One of the chief difficulties met with in studying the fungoid diseases is that they need a very powerful lens, or a microscope, to render them visible. There are few better ways of promoting Nature-study than providing boys with a pocket-lens, and if a microscope could be given annually as a prize to the best student of Nature much might be done to encourage the application of Science to Agriculture.

The book before us is illustrated, and the figures help considerably to elucidate the text. In the first chapter the author is, to our thinking, least successful. It is entitled "general information," and covers too much ground, while it introduces so many scientific terms that a reader who knows little of the subject might be disheartened. We think that the system introduced by Huxley in teaching biology, of taking first one example and treating it thoroughly, and then another, and yet another, until the varieties began to stand out clearly, and classification became evident, would be the best method to adopt here. This chapter would thus become not only an introduction to the science of Fungi, but the dictionary of those scientific terms which are, of necessity, subsequently used throughout the book.

How Fungi enter plants, how they damage or destroy them, and what measures can be taken to combat their attacks are considered. Subsequently, in four chapters, the authors treat of the fungoid diseases of cereals and grasses, of leguminous plants, of potatoes, and of crucifers, while there is an appendix dealing with the fungoid diseases of animals.

These four chapters will be of the most use to the farmer. When any disease is noticed on a plant, he first looks in the book to see what diseases this particular plant may be liable to, and at once turns to the index. To facilitate reference the author in a future edition might with advantage enlarge the already good index provided, for we noticed that neither the words cabbage, turnips, nor mustard, are mentioned, though "Finger and Toe," which attacks the first two, is well described and illustrated, as also the "Damping off" of mustard and cress.

There has long been wanted a small work on the Fungi which produce diseases in plants; one capable of being used both by students and by agriculturists, and this book will supply that want.

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4.—*The Principles of Fruit Growing.* By L. H. Bailey. London: Macmillan & Co. 7s. 6d.

This work, written by the Editor of the Rural Science Series, is the twentieth issue of a book which first appeared in 1897. The present issue is practically a new work, having been re-arranged and re-set, and largely re-written. As the author truly says, of late years much new knowledge has come to the aid of the fruit-grower. The many investigations of insects and fungi, and the means of attacking them, have resulted in a new literature and more certain means of control. We have more rational recommendations to make on the fertilizing of fruit-lands. The older and traditional opinions and notions are gradually giving way to the results of careful investigation.

Fruit growing, in common with all agricultural pursuits, thrives best in certain geographical areas. That is, the business is not capable of equal development in all parts of the country. The leading factor in the distribution of fruit culture is climate, and in general it may be said that the relative annual temperature is the most influential factor. The next is humidity or moisture. Then we have the soil and the sub-soil factors. The author, in treating of the last factor, says :—

> " There is only one thing which is found constantly associated with good orchard land, and that is an open porous subsoil."

The parasite factor is one which gives constant trouble, but :—

> " In practice, the energetic and intelligent fruit-grower will think last of the parasite factor when locating his plantation, for this factor is variable and migratory, and, moveover, there are means of keeping most fruit pests under control. Insects and fungi are, of course, to be reckoned with, and for this reason they are the direct and, perhaps, the most effective means of keeping the farmer in a state of mental alertness."

The author does not consider that much can be done by legal measures to combat these diseases, but that " the most effective legal means are those that endeavour to regulate the commerce in diseased and affected plants—to prevent the spread of the difficulty rather than to solve the difficulty on a given plantation."

In treating of the outlook for fruit-growing the author's remarks appear to us as applicable to this country as they are to the United States. He says :—

> " Of course, one cannot succeed commercially in the growing of fruit if his land, location, and climate, are not proper, even though he may have all the personal qualifications for the business ; but if he has these qualifications, he will probably not choose unfavourable or impossible conditions."
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> " One need have no fear of his success if he grows what people want, or puts it up so as to make them think that they want it."
>
> " The difficulty is probably rather more of unequal or imperfect distribution than of over-production of the commodity."

Fruit-growing is a business, and if it is to be successful it must, in addition to all other factors, be carried on along business lines, and be thoroughly organised. Upon this subject the author makes some very practical suggestions, and, from the section dealing with it we select the following extracts:—

> "Perhaps the last thing the farmer learns, in respect to his own business, is thoroughly to master his local problem. He must feel that his problems of soil and exposure, his limitations of capital, and his own tastes, are all special and possibly unique, and he must then begin to work out his results for his particular conditions. From books and teachers he can learn principles and truths, he can pick up suggestions, and he can, above all, acquire an ability to grasp his particular situation, but he must solve his problems for himself. This is the secret of that close and single-minded attention to business that makes for the greatest success.
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> "Merely to raise fruit is not the end and consummation of fruit-growing. The raising of the fruit is a part in an enterprise, and this enterprise should make the best use of capital and of labour and equipment, and it should secure the greatest results with the least expenditure of effort. In other words the enterprise should be economically efficient.
>
> "Fruit-growing is preferably one part—perhaps the leading part—of a farm scheme: but usually it should not comprise the entire farm scheme. Farm management studies have shown that the most profitable fruit-growing is often that which is combined with general farming. On the other hand, too much general farming directly detracts from the fruit-growing part of the business.
>
> "It is certain that if one is to make a good business of fruit-growing he must devote his best energies to it. Other things may wait, but not the fruit plantations. He must have a 'feeling' for fruit more than for anything else, and the fruit must have first call on men, teams, time, and painstaking oversight. If he does not have this feeling, he does not possess the essentials of a fruit-grower. The pride of a fruit-farm is in the fruit."

The preceding quotations have been taken from the first chapter of this work, in which the author deals with what may be termed general problems. The rest of the book is devoted to a detailed consideration of the subject. After dealing with the site, the protection of fruit plantations, and the tillage of fruit lands, a chapter is devoted to that important, and, up to the present, much neglected subject, the enriching of fruit lands, in other words, the application of manures. There is a general idea that fruit lands, especially orchards, need little or no artificial manure. The author gives some figures which are interesting, and which we will utilize though in a different way to what he does. From his figures we gather that in 20 years, by average crops, there are removed from the soil the following constituents per acre :—

| | In Wheat. Grain. lbs. | In Apples. lbs. |
|---|---|---|
| Nitrogen ... ... | 424·8 | 498·6 |
| Phosphoric Acid ... | 160·2 | 38·2 |
| Potash ... ... | 109·8 | 728·5 |

We have not considered the straw, for in good farming this gets returned to the soil, nor, for the same reason, have we mentioned the large amount of the above-named constituents present in the apple leaves. The figures regarding wheat are those from land which has been continuously cropped, and assume an average yield of 15 bushels an acre. Few farmers would think it possible to grow wheat continuously without manure. Why should not this apply to apples ? The chapter which answers this enquiry is of quite exceptional interest.

The author passes on to the consideration of the planting and subsequent care of the fruit plantation ; of the injuries and pests to which the trees and fruit are liable ; and, finally, to the harvesting of the fruit, the subjects being well illustrated.

The apple takes the chief place among the fruits considered, and while the book is an admirable guide for the fruit-grower generally, it certainly appeals in a very special way to every apple grower.

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### 5.—*Soils and Manures.* By E. J. Russell, D.Sc. Cambridge: The University Press. 3s. 6d.

This " Student's book " is an excellent introduction to the study of the Soil and of the manures chiefly used either to ameliorate the soil or to feed the plants growing upon it. It seems almost a mistake to have called it a student's book, for it is one admirably suited to any farmer who wishes to obtain an insight into the nature and properties of the soil. However, the author seems to have written it expressly for students and in his preface definitely states, " I hope the student will carry out the experiments." One of these experiments is thus described :—

> "A trench 5ft. broad, 30ft. long, and 3ft. deep was dug out: the sides and bottom were lined with loose bricks and stones, and four partitions were put up. The divisions were then filled respectively with a good loam, a peat, a gault clay, a poor sand, and broken chalk. Carrots were sown and gave results shown." "The student should repeat the experiment, using typical local sóils."

How many students could possibly make such an experiment, and, even if they could, would it be worth the time, trouble, and expense? Such an experiment might be carried out at a college, and some typical soils from the district employed. Subsequently the same soils might be used for manurial experiments.

In an Appendix the author gives instructions for the analysis of soils and manures. If it is not generally known, it should be, that the analyses of soils and manures are useless unless very accurate, and that such accurate analyses can only be made by analysts after years of study and experience. The endeavour to make every agricultural student an agricultural analyst is a fault of modern agricultural education. What the educated agriculturist ought to know is the meaning and value of analyses, not how to make them. Few, probably very few, ever succeed in making these analyses, but they waste much time in the attempt to learn what will never be of any use to them.

Agricultural education must be put on a more practical and common sense basis, and the true object of that education, viz., to make sound, practical and successful farmers, should be kept constantly in view.

We have pointed out what we consider the two faults of this book, which, however, only reflect the faults of the age. Apart from these, we have nothing but praise for this very concise and accurate scientific résumé of the present state of knowledge regarding the soil and manures. As a scientist, and authority on the soil, Dr. Russell is pre-eminent. He has also the gift of literary expression. What he knows he can impart to others with a charm quite his own. Last, but not least, while fully realising the necessity there is for each to make his knowledge profitable, he recognises that in all the best work of life there is something above mere monetary gain, and that this is especially true of farming. As he says :—

> "The soil is to be regarded not simply as a mine out of which a little wealth may be extracted, but as a part of Nature, just as

wonderful and as worthy of study as any other part. Whether one is dealing with its history before man appeared on the scene, the changes that long generations of farmers have brought about, its remarkable structure, or the infinite wonder of its microscopic inhabitants, it presents at least as interesting a study as anything else in this wonderful world of ours. The man who has learnt to see something in the soil will have a better time at farming, even if he makes no more money, than the man who has not."

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### 6.—*Oil Seeds and Feeding Cakes.* By WYNDHAM R. DUNSTAN. London: John Murray. 2s. 6d.

British farmers are notoriously conservative, and both science and practice have shown that they have good reason for being so. Yet there is no standing still in this world of progress. Changes must arise, and new means and methods be gradually introduced into the most conservative of industries. Wisdom lies in the happy medium of neither rushing blindly after every new proposition, nor on the other hand of entirely neglecting to move with the times.

Perhaps in no respect have farmers been more conservative than in the use of concentrated feeding stuffs. Linseed cake and cotton cake, both ordinary and decorticated, have gradually become known, but most other cakes are severely neglected, except the compound cakes made by some well-known firms. There are reasons for this. As a rule, every new food is at first more or less disliked by stock. It needs to be introduced into the ration gradually, and cannot suddenly replace a cake to which the stock has become accustomed. Again, it may not be given to them in a proper form. For instance, Soya cake, if given in too large lumps, is known to have at times injurious effects. There are two reasons for this, one is its hardness, and the other its highly nitrogenous nature. It may be taken as a maxim in feeding that the harder the cake the finer it should be ground or crushed before being used. Moreover, no new cake should be used without carefully considering its composition and how it fits into the ration.

The war has been the means of bringing prominently before agriculturists and others four comparatively new sources of oil and of cattle foods, in the form of the cakes left after the oil has been expressed from certain seeds or nut kernels. These four feeding stuffs are copra, or cocoanut cake, palm kernel cake, ground nut (also known as earth nut, or monkey nut) cake, and sesame cake.

Professor Dunstan, who is the Director of the Imperial Institute, gives in this book a lucid and complete account of these four new cakes, of the substances from which they are prepared, of their composition and nutritive value, and of some feeding experiments which have been made with them. Such is the interest of the work from an agricultural standpoint. But it has a much wider scope, for it shows how enormous is the trade in these oil-producing materials, and how important that trade is to the British Empire. Hence farmers, who use these materials, while benefitting themselves, are likewise helping to promote the welfare of the Empire. Issued at a price which brings it within the reach of all, this Imperial Institute monograph should be read by every up-to-date farmer. Incidentally, the book reveals how Germany had secured a virtual monopoly of some of the most valuable products of the tropical possessions of Great Britain. Surely it is time for us to wake up to the importance of these products and learn to utilise them ourselves.

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## 7.—*Soils and Plant Life.* By J. C. CUNNINGHAM and W. H. LANCELOT. London: Macmillan & Co. 5s.

One of the signs of the times is the widespread discontent with the system of education which has prevailed in this country of late years. People feel that something is wrong, although they do not quite know what. Some think that Science has been unduly neglected, and other studies of less value unduly cultivated. May be it is not so much the subjects which are at fault as the method of teaching, or the want of "sound educational principles." Professor Cunningham, in the Preface to this book, says:—

> "An enumeration of a few of these principles will serve as a key to the plan of the book.

1.—Pupils must be led by easy steps from the known to the unknown.

2.—One thing at a time must be taught, and this one thing must be thoroughly understood.

3.—Real progress in education depends upon a pupil's ability to discern agreements and differences.

4.—A teacher should stimulate and direct, but all education comes from the pupil's voluntary effort."

It will be seen that this work is an educational one, intended as a first study in agriculture for rural and high schools. It deals with the soil and plants, and leaves animal studies to be taken up in an advanced course.

The plan adopted by the author is to first give a few paragraphs which contain statements of facts. Then the pupil is set an exercise. The *Object* of this exercise is stated, then the *Procedure* to be followed is given in detail, and, lastly, the *Conclusion* which the experiment, if properly carried out, should lead to. Numerous illustrations help to elucidate the text, and to show how the experiments should be performed. At the end of each chapter there are about ten questions by which the student may test how far he has mastered the contents of the chapter.

The chief value of this book for educational purposes lies in the admirable exercises. If these were carried out by a student, the knowledge they would give, and the training to eyes, hands, and thought they would ensure, could not fail to leave an impression which would last a life-time. In fact, the student would be trained; that is never accomplished by book work alone. How few of us realise that knowledge we do not apply is of no use!

There are over fifty of these exercises, and the more we have studied them the more we are impressed with their value. The following are a few of the objects of these exercises:—No. 13, to show the influence of the amount of moisture in a soil upon its temperature. No. 34, to study how the water travels from the roots to the leaves. No. 37, to learn how to make Bordeaux mixture. No. 47, to compare and judge two samples of seed wheat, and No. 50, to determine the percentage of good seeds, of weed seeds, and of other impurities in a sample of clover or alfalfa seed.

We have selected only a few of the exercises. They are quite sufficient to enable us to realise the interest which young people would take in such education. No wonder the author says:—"Teaching agriculture is a delightful task, provided we do not attempt to tell 'how to farm.' All we should attempt to do is to stimulate and direct the pupil in his desire to find out the fundamental principles of good farming."

The ground covered by the authors is considerable, for in addition to the general study of soils and plants, the principal farm crops are dealt with, including pasture grasses, clovers, and other legumes, and there are lengthy chapters upon both fruit growing and vegetable growing.

We strongly recommend this book to teachers of agriculture, in fact, to all those interested in agricultural education. Not only is it admirable in itself, but it is written by men who seem to see clearly the great problems of the future which depend upon a sound agricultural education. They rightly say first, that "the principal way of securing the much needed increase in our crop yields is *not* to farm more land, . . . . but to increase the yield per acre of that which we are now farming"; and, secondly, that "The strength of nations has always been drawn from the soil, a system of permanent agriculture is therefore indispensable to the prosperity and happiness of our people."

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### 8.—*The Spirit of the Soil.* By G. D. Knox. London: Constable and Co. 2s. 6d.

Dr. J. A. Voelcker, the Consulting Chemist to the Bath and West Society, in a recent Report on the Woburn Experiments, gave some astounding facts regarding an experiment with "bacterised peat." Other investigators, notably the authorities at the Royal Gardens, Kew, have obtained equally remarkable results, and, as is only natural, the thinking portion of the agricultural and horticultural community are keenly anxious to know all that can be known about this new material. The object of the author is to upply this information.

Bacterised peat is the outcome of scientific work, which arose somewhat as follows. Of late years much study has been given to the bacteria now known to be present in fertile soils, and to those which produce nodules on the roots of plants, and so enable these plants to feed on the nitrogen of the air which is present in all soil. Attempts have been made to cultivate these bacteria and to obtain them in such a form that they could be added to a soil in order to increase its fertility. The chief difficulty has been to find a medium in which the bacteria would grow. Professor Bottomley, the botanist, of King's College, London, has devoted years to this study. He experimented with peat, but found that in its natural state it did not contain material on which the bacteria could grow. If, however, the peat were exposed to the air it slowly underwent changes which made it partly soluble in water, and then the bacteria would grow in it. This natural change, however, takes too long, and experiments proved that it could be brought about artificially. If certain aerobic bacteria are added to moist peat, which is then raised to a temperature of 79°F. and kept warm and moist for about a week, 20 to 25 per cent. of it becomes soluble. Steam can then be forced through the peat until all the bacteria are destroyed. The result is a neutral or slightly alkaline substance in which soil bacteria will grow.

The author thus describes the next process :—

> "The treated sterilized peat, rich in organic material, that the bacteria are able to utilize, received a mixed culture of Bacillus radicicola and Azotobacter chroococcum. The bacteria, being at a temperature best suited to their growth, and with an abundant supply of the food material that they require, multiply rapidly, and permeate the mass of the peat. When the whole peat mass is saturated, the action is stopped by drying the peat, and the material is ready to be applied to the soil. The substance so produced is 'bacterised peat.'"

There must be some cause for the astounding results which this substance has given. What is it? The question is more easily asked than answered, but the views now held on the subject are well set forth in this book.

The author describes himself "as a journalist." This partly accounts for the readable nature of the contents, although it deals with profoundly scientific problems. From a scientific standpoint we could have wished a different order in the chapters and subjects treated; but this might easily have rendered the book less popular. Those who wish to get some idea of recent discoveries regarding soil bacteria can do so from this book, and will find some excellent illustrations to help them. There are other illustrations which show in a most striking manner the remarkable effects produced by these soil bacteria, especially when present in bacterised peat.

9.—*The State as Farmer*. By GEORGE RADFORD. London: Smith, Elder & Co. 2s. 6d.

One effect of the war, which seems to have been fairly general, has been to awaken a spirit of criticism and discontent. Men interested in Education are convinced that our past system has been radically wrong. Scientists claim that the nation has scandalously neglected the culture and utilization of scientific subjects. The author of the work under review attacks agriculturists, and is convinced that agriculture has been shamefully neglected by politicians and Parliament, by landlords and farmers, and, in fact, by all who are connected with the land. His assertions are sweeping. Thus he says: "It would be impossible to find in any place or at any time in the world's history a greater accumulation of unapplied information than exists at this moment in relation to all the processes of agriculture."

While we cannot follow the author in his extreme views, we recognise that he has a wide knowledge of both the Science and Practice of agriculture, and that he sees very clearly many of the faults which undoubtedly exist. The remedy he proposes is thus stated:—"The cure lies with a social or State policy, rather than with an individualistic one." The following sentences taken from this book will give some idea of his main proposition.

> "If there is one fact more notorious than another in relation to agriculture it is that the response of the land to tillage and generous treatment is equally generous, even unstinting, and that if we want more produce from a farm we have only to put more labour and nutriment into it."
>
> "Waste of transport, of labour, of material, and of crops is what must be guarded against at every point."
>
> "The supply to farmers of leaflets and recipes is of small avail. The need in every direction is for joint work under supreme science in the nation's cause."

As an illustration of how this would work we may take the subject of the eradication of weeds, which the author says "is essentially a work, not for one farmer, but for all acting together with one impulse and on a concerted scheme," and he considers "the eradication of weeds would make a fine test of the adequate working by the State of its own lands." We sincerely hope that ere the State is made the sole farmer or controller of farming in this country some task like the eradication of weeds may be given it to test its power.

The book is interesting, and shows up some of the faults which are only too numerous in the farming of to-day. But we doubt if matters would be improved even were the State to take supreme control. What the State does is done by a Department, and we should like to ask the author whether he considers the Board of Agriculture more competent to manage the farming of this country than are even the present generation of farmers. Farming is a business, and success comes from a rare combination seldom found in individuals, never in a collective body. Inherited gifts, insight, an ideal, the love of the work, and a certain amount of enterprise and speculation, all go to make the type of men who have raised British farming to its unique position. These gifts are individual, and we believe with Carlyle that to the great men the world owes all its progress, and not to the crowd. Hence, we do not believe in the State as farmer. Holding these views we have, nevertheless, read this book with interest, and if we cannot go with the author in his idea as to the best remedy for the ills he has pointed out, still he has done good in drawing attention to those aspects of farming which need improving.

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### 10.—*The Wheat Industry.* By N. A. Bengtson and Donee Griffith. London: Macmillan & Co. 3s.

The idea of this book, as indeed of "The Industrial Series" to which it belongs, seems to us excellent. The aim of the series is to consider the conditions governing various important industries in such a way that the information can be utilized as a means of education in schools. It is desirable to encourage interest in such subjects in this way, as it both stimulates action and promotes clear thinking.

Wheat has an historical interest. Being very widely cultivated, and not consumed in the districts where grown, its consideration acts as an inducement to the study of geography, as represented by wheat regions, trade routes, etc. It has also its domestic as well as its agricultural interest.

One has only to mention the above-named points to realise what an excellent subject for educational purposes the wheat industry could be made in the hands of competent teachers.

The authors have endeavoured to treat the subject in this spirit. The book is not merely for indoor-reading, but is intended for use in practical work out-of-doors. "The ideal of everyone should be to observe closely and to describe accurately." "The gain in power . . . more than repays for the time spent." The students are expected to keep notes, and to make careful records of all observations. The authors also suggest that pupils not living in the country should be taken to see a big wheat farm, and also a flour mill, etc. These visits they say will be a pleasure, "*when made for a purpose.*"

We emphasise these suggestions, as they are worth bearing in mind. In France this custom of taking pupils to museums, etc., with a purpose, has long been in vogue. Here, unfortunately, far too many of us, young and old, wander aimlessly about museums and exhibitions, and consequently often fail to learn the great lessons they teach to those who visit them for a purpose.

In this book the wheat plant itself is first studied; then its cultivation and growth, harvesting, threshing, storage, and milling, receive full attention. The rest of the book is devoted to the wheat industry, in Australia, Argentina, the United States, Canada, Asia, and Europe. Its illustrations are both good and numerous, and the work is an excellent endeavour to present the wheat industry in all its branches in a way which can be studied by everyone. It is, however, curious that there is no account of how bread is made in the home. The only fault we have to find is with the Index, which is far from complete.

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11.—*Surveying and Building Construction.* By A. H. Haines and A. F. Hood Daniel. London: Longmans, Green & Co. 10s. 6d.

This book, written by the Lecturers in Surveying and Building Construction at the South-Eastern Agricultural College, Wye, is intended for agricultural students, land agents, and farmers. The work is divided into two parts. The first deals with surveying, and is mainly suited for students. All the instruments generally used in surveying are well described and illustrated, while there are numerous figures to help the explanations of their use.

The second part, which is the more practical, deals with building construction. Commencing with excavations, the bricklayer's and mason's work is dealt with, then the carpenter's and joiner's, and later on, plumbing. The Local Government Board's Regulations, which are very fully stated, are, unfortunately, inserted between the carpenter's work and the chapter on plumbing: they might, with advantage, have been placed at the end of the book. Finally a few very short chapters are devoted to the consideration of rural cottages, stables, a cow-house, Dutch barn, etc. These contain plans and illustrations, and may be considered to represent the final application of the principles inculcated in the preceding chapters. The work is likely to prove useful to those for whom it is intended.

# Bath and West and Southern Counties Society.

## WORCESTER MEETING, 1915.

## JUDGES.

### HORSES.

**Agricultural.**—F. W. Griffin, Boro' Fen, Peterborough.

**Hunters.**—Hon. C. B. Portman, Goldicote, Stratford-on-Avon.

**Ponies.**—J. Hill, Mowbray Lodge, Church Stretton.

**Harness, Saddle and Jumping.**—G. Gordon, The Barn House, Sherborne, Dorset.

### CATTLE.

**Devon.**—L. H. Alford, Horridge, Ashford, Barnstaple.

**South Devon.**—T. W. Luscombe, Stancombe, Totnes.

**Shorthorn and Dairy.**—W. H. Hitch, Cowley, near Cheltenham.

**Hereford.**—J. H. Yeomans, Withington, Hereford.

**Sussex.**—W. Massie, Mulgrave Estate Office, Lythe, Whitby.

**Aberdeen-Angus.**—C. W. Schroeter, Tedfold, Billinghurst, Sussex.

**Jersey Cows and Heifers.**—J. H. Shore, Whatley Combe, near Frome, Somerset.

**Jersey Bulls.**—W. Arkwright, Sutton Hall, Chesterfield.

**Guernsey.**—J. D. T. Parsons, 9, Manor Road, Rusthall, Tunbridge Wells.

**Kerry and Dexter.**—Colonel W. Stallard, St. John's House, Worcester.

### SHEEP.

**Shropshire.**—A. Mansell, College Hill, Shrewsbury.

**Devon Longwoolled.**—W. Greenway, Manor Farm, Halse, Taunton.

**South Devon.**—W. H. Pain, High House, Kingsbridge, Devon.

**Kent or Romney Marsh.**—H. M. Cobb, Higham, Rochester.

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**Southdown.**—H. PENFOLD, La Bagatelle, The Grove, Blackheath, S.E.

**Hampshire Down.**—P. C. TORY, Shapwick, Blandford, Dorset.

**Oxford Down.**—W. D. LITTLE, Middleton Stoney, Bicester, Oxon.

**Dorset Horn.**—C. HAWKINS, Waddon, Dorchester.

**Dorset Down.**—W. C. BARTLETT, Durweston, Blandford, Dorset.

**Ryeland.**—E. SMITH, 111, Bransford Road, Worcester.

**Kerry Hill.**—F. E. BEAVAN, The Graig, near Knighton, Rads.

## PIGS.

**Berkshire.**—J. FRICKER, Suddon Grange, Wincanton.

**Large Black.**—J. H. GLOVER, Cornwood, South Devon.

**Large and Middle White and Tamworth.**—Colonel F. A. WALKER-JONES, The Manor House, Burton, Westmoreland.

## PRODUCE.

**Cider.**—J. ETTLE, F.R.H.S., 37, Stanley Grove, Weston-super-Mare.

**Cheese.**—W. H. ALLEN, The Grange, Shepton Mallet.

**Cream Cheese, Butter and Cream.**—D. T. NEAGLE, 23, Whatley Road, Clifton, Bristol.

## COMPETITIONS.

**Butter-Making.**—D. T. NEAGLE, 23, Whatley Road, Clifton, Bristol; and H. BAILIS TUCKER, Fir Lodge, Bloomfield Gardens, Bath.

**Milking.**—R. J. HOSKINS, Beard Hill Farm, Shepton Mallet.

# PRIZE AWARDS, 1915.

⁂ An animal designated in this list as the "reserve number" is entitled, *conditionally*, to succeed to any prize that may become vacant in its class by reason of the animal placed above it by the Judges failing afterwards to qualify.

† Animals where not otherwise stated, may be considered to have been bred by the Exhibitor.

Abbreviations Explained :—S., sire ; d., dam ; s.d., sire of dam ; y, year ; m., month ; w., week ; d., day; R, Reserve; V.H.C., Very Highly Commended; H.C., Highly Commended ; C., Commended.

## HORSES.

### SHIRE.

(Registered or eligible for registration in the Shire Horse Society's Stud Book).

### Class 1.—*Shire Mare, in foal, or with foal at foot.* [7 entries.]

**I. (£15.)**—The Edgcote Shorthorn Co., Ltd., Edgcote, Banbury, brown, **Writtle Coming Queen,** foaled 1909, bred by the late J. S. Hodge, The Rollstons, Writtle, Chelmsford ; s Ratcliffe Coming King (25568), d Writtle Duchess II. (46771, Vol. xxxi.), s d Moor's Regent (17492) ; with foal.

**II. (£10.)**—Captain R. W. Cooper, Wyld Court, Hampstead Norris, Berks, bay, **Woodfield Rosebud** (65480), foaled 1909, bred by W. Millner, Woodfield Farm, Solihull ; s Yorkshire Lion (23884), d Woodfield Rose (58847), s d Drayman 23rd (19551) ; with foal by Overpool Conqueror.

**III. (£3.)**—The Earl Beauchamp, K.G., Madresfield Court, Malvern, grey, **Madresfield Frolic** (67754), foaled 1909 ; s Danesfield Patriot (25109), d South-hill Bounce, s d South-hill Paxton ; with foal by Cross-in-Hand Friar.

## *SPECIAL PRIZES.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the Counties of Hereford and Worcester, who were members of that Society.*

### *Best Local Exhibits in Class* 1.

**I. (£5.)**—The Earl Beauchamp, K.G., Madresfield Court, Malvern, grey, **Madresfield Frolic** (67754), foaled 1909 ; s Danesfield Patriot (25109), d South-hill Bounce, s d South-hill Paxton ; with foal by Cross-in-Hand Friar.

**II.** (**£2.**)—B. Ashwin, Littleton Pastures, Evesham, brown, **Honeybourne Fuchsia** (63953), foaled 1908; s Knottingley Royal (20619), d Honeybourne Lass, s d Black Chief (16523); with foal by Ratcliffe Premier (29775).

**R.**—B. Ashwin, bay, **Ingon Sunlight** (676211), foaled 1909, bred by R. C. Crofts, Ingon Manor, Stratford-on-Avon; s Knottingley Royal (20619), d Moor's Sunbeam, s d Moor's Zealot (15713); with foal by Bardon Hero (30134).

### Class 2.—*Shire Filly or Gelding, foaled in* 1914. [16 entries.]

**I.** (**£10.**)—R. L. Mond, J.P., M.A., F.R.S.E., Combe Bank, near Sevenoaks, bay filly, **Farewell Tolworth,** bred by the Exors. of R. Thirlby, Tolworth Park, Surbiton; s King of Tandridge (24351), d Swan Leader (58525), s d Hitchin Ringleader (17397).

**II.** (**£5.**)—E. Green, The Moors, Welshpool, brown filly; s Moors Kitchener (25443), d Willaston Countess (46726), s d Warton Drayman (19223).

**III.** (**£3.**)—W. and H. Whitley, Primley Farm, Paignton, bay filly, **Primley Gladys** (Vol. xxxvii.); s Primley Draughtsman (30801), d Tandridge Wallflower (68886), s d Norbury Menestrel (23543).

**R.**—The Earl of Powis, Powis Castle, Welshpool, dark brown filly, **Welshpool Future Queen**; s Ratcliffe Forest King, d Themis of Welshpool (62107), s d Oak Apple 5th (23570).

**H.C.**—W. H. Palmer, Stokes Farm, Wokingham, brown filly, **Monk's Green Melody**, bred by A. Smiles, Monk's Green, Fetcham, Leatherhead; s Norbury Menestrel (23543), d Amberfield Rosebud (55909), s d Hendre Champion (18079).—The Edgcote Shorthorn Co., Ltd., Edgcote, Banbury, bay filly, **Beachendon Blue Bell,** bred by W. C. and A. J. Flowers, Beachendon, Aylesbury; s Halstead Blue Blood (27397), d Pendley Siren (64596), s d Catthorpe Cornelian (25058).

**C.**—The Earl Beauchamp, K.G., Madresfield Court, Malvern, grey filly, **Madresfield Lilac**; s Cross-in-Hand Friar (29278), d Yatesbury Pansy, s d Royal Rock 2nd.—F. E. Muntz, Umberslade, Hockley Heath, Warwickshire, bay filly, **Umberslade May Flower** (Vol. xxxvii.); s Sussex Statesman (29924), d Umberslade Flower (65229), s d King Forest (24347).

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester, who were members of that Society.*

### *Best Local Exhibit in Class* 2.

**I.** (**£5.**)—The Earl Beauchamp, K.G., Madresfield Court, Malvern, grey filly, **Madresfield Lilac**; s Cross-in-Hand Friar (29278), d Yatesbury Pansy, s d Royal Rock 2nd.

### CLASS 3.—*Shire Filly or Gelding, foaled in* 1913. [13 entries.]

**I.** (£10.)—W. AND H. WHITLEY, Primley Farm, Paignton, bay filly, **Primley Fantasy** (79209), bred by F. W. Griffin, Boro' Fen, Peterborough; s Redlynch Forest King (23626), d Menestrel Forest Queen (61179), s d Norbury Menestrel (23543).

**II.** (£5.)—THE EARL OF POWIS, Powis Castle, Welshpool, brown filly, **Maple Leaf**; s Childwick Champion (22215), d Themis of Welshpool (62107), s d Oak Apple 5th (23570).

**III.** (£3.)—THE EDGCOTE SHORTHORN Co., Ltd., Edgcote, Banbury, brown filly, **Hogshaw Emmeline**, bred by J. B. Hughes, Hogshaw Farm, Winslow; s Carlton Prince Albert (28177), d Hogshaw Graceful (63930, Vol. xxxii.), s d Hale Forest King (25252).

**R.**—R. L. MOND, J.P., M.A., F.R.S.E., Combe Bank, near Sevenoaks, bay mare, **Enderby Fashion** (77857), bred by E. A. Kirk, Mavis Enderby, Spilsby; s King of Tandridge (14351), d Enderby Combine (66983), s d Cattlegate Combination (21254).

**H.C.**—G. F. FENWICK, The Verzons, Ledbury, Herefordshire, bay filly, **Bunney Duchess 2nd** (177269), bred by the late W. Smeeton, The Grange, Bunney, Notts.; s Garn King (24925), d Bunney Duchess (66302), s d Tatten Friar (21953).—DUKE OF WESTMINSTER, Eaton, Chester, bay filly, **Eaton Modesty**; s Lymm Champion (22562), d Dora of Tandridge, s d Victor of Wordsley.

**C.**—THE EARL OF BEAUCHAMP, K.G., Madresfield Court, Malvern, grey filly, **Madresfield Knapweed**; s Romulus 5th (28722), d Yatesbury Pansy, s d Royal Rock 2nd.—CAPTAIN R. W. COOPER, Wyld Court, Hampstead Norris, Berks, bay mare, **Duchess**, bred by J. Tomes; s Halstead Blue Beard (29397), d Deneham Coral.

## *SPECIAL PRIZES.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester, who were members of that Society.*

### *Best Local Exhibits in Class* 3.

**I.** (£5.)—G. F. FENWICK, The Verzons, Ledbury, Herefordshire, bay filly, **Bunney Duchess 2nd** (177269), bred by the late W. Smeeton, The Grange, Bunney, Notts; s Garn King (24925), d Bunney Duchess (66302), s d Tatten Friar (21953).

**II.** (£2.)—THE EARL BEAUCHAMP, K.G., Madresfield Court, Malvern, grey filly, **Madresfield Knapweed**; s Romulus 5th (28722), d Yatesbury Pansy, s d Royal Rock 2nd.

### CLASS 4.—*Shire Filly or Gelding foaled in* 1912. [3 entries.]

**I.** (£10.)—THE EDGCOTE SHORTHORN Co., LTD., Edgcote, Banbury, bay filly, **Blackthorn Betty**, bred by A. E. S. Hepworth, Marsh Gibbon, Bicester; s Halstead Blue Blood (27397), d Blackthorn Queen (73497), s d Ravenspur (22709).

## *SPECIAL PRIZES.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

*Best Local Exhibits in Class* 4—*First prize,* £5—*second,* £2.

[NO AWARD.]

## *MEDAL.*

### OFFERED BY THE SHIRE HORSE SOCIETY.

*A Gold Medal, or the sum of* £10, *for the best Mare or Filly in the Shire Horse Classes, under Condition* 47, *and to the Breeder of the winner, under the conditions stated, a prize of* £5.

**I.**—THE EDGCOTE SHORTHORN CO., LTD., Edgcote, Banbury, bay filly, **Blackthorn Betty,** bred by A. E. S. Hepworth, Marsh, Gibbon, Bicester; s Halstead Blue Blood (27397), d Blackthorn Queen (73497), s d Ravenspur (22709).

**R.**—R. L. MOND, J.P., M.A., F.R.S.E., Combe Bank, near Sevenoaks, bay filly, **Farewell Tolworth,** bred by the Exors. of R. Thirlby, Tolworth Park, Surbiton; s King of Tandridge (24351), d Swan Leader (58525), s d Hitchin Ringleader (17397).

### CLASS 5.—*Shire Stallion, foaled before* 1913. [6 entries.]

**I. (£15.)**—F. E. MUNTZ, Umberslade, Hockley Heath, Warwickshire, bay, **King's Warrior** (31563), foaled 1912, bred by T. Jones, Quarry Farm, Godstone, Surrey; s King of Tandridge (24351), d Marden Fan 2nd (57679), s d Tatton Friar (21953).

**II. (£10.)**—CAPTAIN R. W. COOPER, Wyld Court, Hampstead Norris, Berks, brown, **Overpool Conqueror** (28649), foaled 1909, bred by J. K. Christopherson, Overpool, Whitby, Chester; s Holker Jevo (23363), d Overpool Bet (61428), s d Ercall Lad (11396).

## *SPECIAL PRIZES.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

*Best Local Exhibits in Class* 5—*First prize,* £5—*second,* £2.

[NO AWARD.]

### CLASS 6.—*Shire Stallion, foaled in* 1913. [10 entries.]

**I.** (**£15.**)—C. MACIVER, Blaisdon Hall, Longhope, Glos., bay, **Blaisdon Draughtsman** (32113); s Warton Draughtsman (27895), d Blaisdon Princess (53080), s d Montford Jupiter (18940).

**II.** (**£10.**)—R. L. MOND, J.P., M.A., F.R.S.E., Combe Bank, near Sevenoaks, bay, **Sussex Freedom** (32847), bred by T. Luckin, Thackenham Place, Pulborough, Sussex; s Norbury Menestrel (23543), d Beachendon Model (44047), s d Puckrup Prince Harold (18294).

**III.** (**£3.**)—F. E. MUNTZ, Umberslade, Hockley Heath, Warwickshire, bay, **Halstead Menestrel 3rd** (32413); s Redlynch Forest King (23626), d Halstead Duchess 3rd (54035), s d Menestrel (14180).

### *SPECIAL PRIZES.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

*Best Local Exhibits in Class 6—First prize,* £5—*second,* £2.

[NO AWARD.]

### CLASS 7.—*Shire Colt, foaled in* 1914. [10 entries.]

**I.** (**£15.**)—R. L. MOND, J.P., M.A., F.R.S.E., Combe Bank, near Sevenoaks, bay, **Sundridge Crown Royal**, bred by the Duke of Westminster, Eaton Hall, Chester; s Eaton Nonsuch (27301), d Naseby Rambler (71776), s d Birdsall Menestrel (19337).

**II.** (**£10.**)—W. AND H. WHITLEY, Primley Farm, Paignton, brown, **Primley Gladiator** (Vol. xxxvii.); s Tatton Dray King (23777), d Primley Doreen (72014), s d Lockinge Colonist (21609).

**III.** (**£3.**)—E. GREEN, The Moors, Welshpool, brown, bred by T. Jones, Hurst, Westbury, Salop; s Mons Kitchener (25443), d Winsley Royal (76507), s d Oak Apple 5th (23570).

**R.**—F. E. MUNTZ, Umberslade, Hockley Heath, Warwickshire, bay, **Muckton King** (Vol. xxxvii.), bred by W. Needham, Muckton, Louth; s King of Tandridge (24351), d Muckton Truffle (71759), s d Lockinge Truffle (23453).

**C.**—CAPTAIN R. W. COOPER, Wyld Court, Hampstead Norris, Berks, bay; s Marden Forest King (28534), d Flanchford Gem (56941), s d Brisbane (12839).

### *SPECIAL PRIZES.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

*Best Local Exhibits in Class 7—First prize,* £5—*second,* £2.

[NO AWARD.]

## HUNTERS.

### CLASS 8.—*Hunter Mare, in-Foal, or with Foal at foot.* [7 entries.]

I. (£15.)—E. W. ROBINSON, Liscombe, Leighton Buzzard, brown, **Vademecum,** foaled 1903, bred by R. Downes ; s Hackler, d Verily, s d Stylites ; with foal by The Tower.

II. (£10.)—F. B. WILKINSON, Cavendish Lodge, Edwinstowe, chestnut, **Shebeen** ; s Barsac ; with foal.

III. (£3.)—MRS. P. A. SHAW, Steyning Manor, Stogursey, Bridgwater, chestnut, **Patient** (4939 Vol. vii.), aged ; with foal by Palmarés.

R.—G. B. GAME, Barn House, Broadway, Worcestershire, chestnut, **Columbine,** foaled 1903 ; s Pantomime ; with foal by Gilgandra.

## *MEDALS.*

OFFERED BY THE HUNTERS' IMPROVEMENT AND NATIONAL LIGHT HORSE BREEDING SOCIETY, UNDER CONDITIONS 48.

*A Gold Medal, or* £5 *and a Bronze Medal, for the best Hunter Brood Mare in Class* 8 *registered with a number in the Hunter Stud Book at the time of entry or within a month of the award, not having previously won the above-named Society's Gold Medal as a Brood Mare in* 1915, *and which must have her foal at foot, or produce a living foal in* 1915, *to a thoroughbred horse or Registered Hunter sire. In the second instance a certificate to that effect must be forwarded before the Medal is sent.*

I.—E. W. ROBINSON, Liscombe, Leighton Buzzard, brown, **Vademecum,** foaled 1903, bred by R. Downes ; s Hackler, d Verily, s d Stylites ; with foal by The Tower.

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Local Exhibit in Class* 8.

I. (£5.)—G. B. GAME, Barn House, Broadway, Worcestershire, chestnut, **Columbine,** foaled 1903 ; s Pantomime ; with foal by Gilgandra.

### CLASS 9.—*Hunter Filly, Colt, or Gelding, foaled in* 1914. [8 entries.]

I. (£10.)—E. W. ROBINSON, Liscombe, Leighton Buzzard, brown colt, **A 1** ; s The Tower, d Vademecum, s d Hackler.

II. (£5.)—W. A. HOLMES, The Grange, Lazenby, Eston S.O., Yorks, chestnut filly, **Gold Link** ; s Passo Roubles, d Lady Dora 2nd, s d Pitch and Toss.

**III.** (**£3.**)—H. J. King, Poles, near Ware, Herts, grey, **The Baron** ; s Pernambuco, d Queen of the Forest 2nd.

**R.**—Mrs. B. J. Brierley, Southwick Park, Tewkesbury, black filly, **Surprise** ; s Keystone, d Onyx.

**H.C.**—Rev. E. T. Murray, Bourton-on-the-Hill Rectory, Glos., chestnut filly, **Prudence** (5028 H.S.B.) ; s Puro Caster, d Diana 4th (4889 H.S.B.), s d Grand National.

**C.**—G. B. Game, Barn House, Broadway, Worcs., bay colt ; s Abstainer, d Columbine, s d Pantomime.—F. H. Unwin, Longdon Hall, near Tewkesbury, chestnut filly, **Dear Me** ; s Great Scott, d Caressante, s d Johnny Morgan.

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Local Exhibit in Class* 9.

**I.** (**£5.**)—G. B. Game, Barn House, Broadway, Worcs., bay colt ; s Abstainer, d Columbine, s d Pantomime.

**R.**—F. H. Unwin, Longdon Hall, near Tewkesbury, chestnut filly, **Dear Me** ; s Great Scot, d Caressante, s d Johnny Morgan.

## Class 10.—*Hunter Filly, Colt or Gelding, foaled in* 1913. [9 entries.]

**I.** (**£10.**)—F. B. Wilkinson, Cavendish Lodge, Edwinstowe, Newark, brown filly, **Repeat 2nd**, bred by W. B. Swallow, Ulceby, Lincolnshire ; s Akbar, d Repetition, s d Wales.

**II.** (**£5.**)—Rev. E. T. Murray, Bourton-on-the-Hill Rectory, chestnut gelding, **Pasch Egg** ; s Thistledown, by Common, d Diana 4th (4889 H.S.B.), s d Grand National.

**III.** (**£3.**)—G. S. Price, The Homme, Ross-on-Wye, bay gelding, **Dan Leno** ; s Dandolo, d Dolly Gray, s d Irish Dictator.

**R.**—Sir F. Cawley, Bart., M.P., Berrington Hall, Leominster, chestnut colt ; s Mirador, d Getto.

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Local Exhibit in Class* 10.

**I.** (**£5.**)—G. S. Price, The Homme, Ross-on-Wye, bay gelding, **Dan Leno** ; s Dandolo, d Dolly Gray, s d Irish Dictator.

**R.**—Sir F. Cawley, Bart., M.P., Berrington Hall, Leominster, chestnut colt ; s Mirador, d Getto.

### CLASS 11.—*Hunter Filly or Gelding, foaled in* 1912. [6 entries.]

**I. (£10.)**—E. W. ROBINSON, Liscombe, Leighton Buzzard, brown gelding, **Comissator**; s Common, d Vademecum, s d Hackler.

**II. (£5.)**—W. VIZARD, Sundridge, Kent, bay filly, **Winkle** (4543), bred by F. J. Burdett, Court Farm, Billingshurst; s Hanover Square, d Piper (4542).

**III. (£3.)**—H. J. KING, Poles, near Ware, Herts, grey filly, **Silver Birch**; s Wildfire, d Queen of the Forest 2nd.

**R.**—A. TERRY, Boycot Farm, Droitwich, bay gelding.

**H.C.**—SIR F. CAWLEY, Bart., M.P., Berrington Hall, Leominster, bay colt; s Skedaddle, d Jane, s d Spindlelegs.

### *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Local Exhibit in Class* 11.

**I. (£5.)**—A. TERRY, Boycot Farm, Droitwich, bay gelding.

**R.**—SIR F. CAWLEY, Bart., M.P., Berrington Hall, Leominster, bay colt: s Skedaddle, d Jane, s d Spindlelegs.

### CLASS 12.—*Hunter Mare or Gelding, foaled in* 1911. [11 entries.]

**I. (£10.)**—W. A. HOLMES, The Grange, Lazenby, Eston S.O., Yorks, brown gelding, **Wilton Drummer**; s Drummer Kelly, d Lady Deaness, s d La Dolphin.

**II. (£5.)**—F. B. Wilkinson, Cavendish Lodge, Edwinstowe, Newark, chestnut gelding, **Tophole,** bred by W. Brown, Slingsby, Yorks; s Charkbird.

**III. (£3.)**—B. J. BISHOP, Roddimore, Winslow, Bucks.

**R.**—J. WILLIAMS, Eithinduonissa, Mydrim, St. Clears, bay gelding, **Quick Silver,** bred by — Jenkins, Cardiff; s St. Pancras, d Huntress, s d Anvil.

**H.C.**—J. H. STOKES, Great Bowden, Market Harborough, bay gelding, **Wattle,** bred by — Sewell, Egleton Oakham; s Wild Willow.

### CLASS 13.—*Hunter Mare or Gelding, foaled before* 1912, *to carry under* 14 *stone.* [12 entries.]

**I. (£20.)**—J. H. STOKES, Great Bowden, Market Harborough, chestnut gelding, **Red Dennis,** foaled 1910; s Dennis Richard, s d by Wales.

**II. (£10.)**—W. A. HOLMES, The Grange, Lazenby, Eston S.O., Yorks, brown gelding, **Wilton Drummer**; s Drummer Kelly, d Lady Deaness, s d La Dolphin.

**III. (£3.)**—B. DAVIES, Yeaton, Baschurch, Salop, bay gelding, **Tango,** foaled 1909; s Otterburn.

**R.**—LIEUT. T. K. STEVENSON, The Green, Great Bowden, Market Harborough, chestnut gelding, **Royal Sovereign,** foaled 1908; s Gold.

**H.C.**—LIEUT. T. K. STEVENSON, brown gelding, **Warder,** foaled 1910; s Marksman.

CLASS 14.—*Hunter Mare or Gelding, foaled before* 1912, *to carry* 14 *stone or over.* [12 entries.]

**I. (£20.)**—B. G. BISHOP, Roddimore, Winslow, chestnut gelding, **Goldmine,** foaled 1909.

**II. (£10.)**—J. H. STOKES, Great Bowden, Market Harborough, bay gelding, **The Baron,** foaled 1909.

**III. (£3.)**—E. G. BEARD, Edmondscote Manor, Leamington, chestnut gelding, **Goldfinch,** foaled 1910.

**R.**—B. DAVIES, Yeaton, Baschurch, bay gelding, **Firkins,** foaled 1910; s Brewery.

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

*Best Local Exhibit in Class* 13 *or* 14.

**I. (£5.)**—G. H. GREEN, Wigmore Grange, Leintwardine, bay gelding, **Comet,** foaled 1910; s Sundown, d Conny, s d St. Clair.

**R.**—C. H. C. PARTRIDGE, Little Lambswick, Tenbury, Worcestershire, dark brown mare, **Echo,** bred by G. Lea, Falconer's Farm, Great Malvern; s Keystone 2nd, s d Christmas Carol.

CLASS 15.—*Hunter Mare or Gelding, foaled before* 1912, *that has not won a Prize of* £10 *or over under saddle at any Show held previous to April* 2, 1915. [19 entries.]

**I. (£10.)**—J. H. STOKES, Great Bowden, Market Harborough, chestnut gelding, **Red Denis,** foaled 1910; s Dennis Richard, s d by Wales.

**II. (£5.)**—B. G. BISHOP, Roddimore, Winslow, chestnut gelding, **General.**

**III. (£3.)**—LIEUT. T. K. STEVENSON, The Green, Great Bowden, Market Harborough, brown gelding, **Warder,** foaled 1910; s Marksman.

**R.**—E. G. BEARD, Edmondscote Manor, Leamington, chestnut gelding, **Goldfinch,** foaled 1910.

**H.C.**—B. DAVIES, Yeaton, Baschurch, bay gelding, **Firkins,** foaled 1910; s Brewery.—W. G. MEWBURN, High House Farm, Rowington, Warwick, brown gelding, **Periscope,** foaled 1910.

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Local Exhibit in Class* 15.

**I.** (**£5.**)—G. H. Green, Wigmore Grange, Leintwardine, bay gelding, **Comet,** foaled 1910; s Sundown, d Conny, s d St. Clair.

**R.**—C. H. C. Partridge, Little Lambswick, Tenbury, dark brown mare, **Echo.**

## *MEDAL.*

### Offered by the Hunters' Improvement and National Light Horse Breeding Society, under Condition 49.

*A Silver Medal, or* £1 (*at the option of the winner*), *for the Best Hunter Mare or Gelding, of any age, exhibited by a member of the Hunters' Improvement and National Light Horse Breeding Society, whose subscription to that Society must have been paid within a month of the award.*

*Only prize-winners in the classes were eligible for these Medals.*

**I.**—W. A. Holmes, The Grange, Lazenby, Eston, S.O., Yorks, brown gelding, **Wilton Drummer.**

## PONIES.

### Class 16.—*Pony Mare, not exceeding* 14.2 *hands, suitable to breed Polo or Riding Ponies, in-foal, or with foal at foot.—First prize,* £8—*second,* £4—*third,* £2. [2 entries.]

[No Exhibit.]

### Class 17—*Pony Mare, not exceeding* 13.2 *hands.* [1 entry.]

**I.** (**£8.**)—F. H. Unwin, Longdon Hall, near Tewkesbury, cream, **Meringue,** aged.

### Class 18.—*Pony Filly, Colt or Gelding, foaled in* 1913, *not exceeding* 14.2 *hands.* [2 entries.]

**I.** (**£8.**)—H. J. King, Poles, near Ware, Herts, bay colt, **Denmark,** foaled 1913; s Wildfire, d Dainty.

### Class 19.—*Pony Filly, Colt or Gelding, foaled in* 1912, *not exceeding* 14.2 *hands.* [2 entries.]

**I.** (**£8.**)—J. E. A. W. Fleming, Stoneham Park, Eastleigh, Hants, black colt, **Guiding Star** (Vol. xxii., G.S.B. and Supp. 1914 N.P.S.B.), bred by E. S. Tomlinson, North Ranceby, near Grantham; s Royal Gard (Vol. xx., 547), d Gatien Star (Vol. xx., 286), s d Roscius.

**II.** (**£4.**)—R. L. Drury, 108, Droitwich Road, Worcester, chestnut gelding; s Eastergate.

CLASS 20.—*Pony Stallion, not exceeding* 15 *hands, suitable to get Polo or Riding Ponies.—First prize, £8—second, £4—third, £2.*

[NO ENTRY.]

## *MEDALS.*

### OFFERED BY THE NATIONAL PONY SOCIETY.

*A Silver Medal for the best Polo Pony Brood Mare in the Brood Mare class, registered or eligible for registration in the Stud Book.*

[NO AWARD.]

*A Silver Medal for the best Polo Pony Stallion, registered or eligible for registration in the Stud Book; or best Polo Pony Entire Colt one, two or three years old, entered or eligible for the Supplement, viz., out of a Registered or Entered Dam.*

**I.**—J. E. A. W. FLEMING, Stoneham Park, Eastleigh, Hants, black colt, **Guiding Star** (Vol. xxii., G.S.B. and Supp. 1914 N.P.S.B.).

**R.**—H. J. KING, Poles, near Ware, Herts., bay colt, **Denmark.**

*A Bronze Medal for the best Foal, entered or eligible for the Supplement, viz., out of a Registered or Entered Dam.*

[NO AWARD.]

*These Medals were offered subject to Condition No.* 51.

## HARNESS.

CLASS 21.—*Mare or Gelding, not over* 14.2 *hands, driven in harness on the first day of Show.* [8 entries.]

**I. (£10.)**—W. W. BOURNE, Garston Manor, Watford, Herts, bay gelding, **Bricket Fame,** bred by W. Cliff, Melbourne Hall, York; s Royal Success, d Worteley Belle, s d Sir Horace.

**II. (£5.)**—MRS. A. C. KING, Brachfield Manor, Romsey, Hants, silver chestnut gelding, **Harviestown Eclat,** foaled 1910, bred by J. E. Kerr, Harviestown Castle, Dollar, N.B.; s Matthias, d Tissington Glaze.

**III. (£2.)**—MISS G. M. HENEGAN, Priory Lodge, Cheltenham, chestnut gelding, **Mittendale.**

**R.**—MISS A. J. LINDNER, The Conigree, Ledbury, bay gelding, **Welsh Confidence,** bred by W. Newman, Linger, Brampton Bryan; s Dilham Confidence, d Kitten.

CLASS 22.—*Covert or Lady's Mare or Gelding, any height, for riding purposes, shown in saddle on the first day of Show.* [7 entries.]

**I. (£10.)**—MRS. W. C. N. CHAPMAN, Heppington, Canterbury, Kent, chestnut gelding, **Gay Cavalier,** foaled 1910; s Crackenthorpe.

**II.** (**£5.**)—J. Day, Stone House, East Pennard, Shepton Mallet, brown gelding, **Union Jack**, foaled 1910, bred by J. Bennett, Down House, Dursley, Glos., ; s S. Nicholas.

**III.** (**£2.**)—J. Homes, Hunt Hotel, Leighton Buzzard, Beds., grey mare, **Perfect**, foaled 1909 ; s Perfection, d by Royal Bridegroom.

**R.**—J. Norbury, Heathside, Knutsford, Cheshire, brown gelding, foaled 1910.

## Class 23.—*Mare or Gelding,* 15 *hands or over, driven in harness on the second day of Show.* [9 entries.]

**I.** (**£10.**)—Mrs. B. Tilbury, 28, Westbourne Gardens, Hove, Sussex, chestnut gelding, **Gaythorne**, bred by T. Prentice, Carolside, Uddingstone, N.B. ; s Mathias, d Sweet Lips, s d North Star.

**II.** (**£5.**)—P. Smith, Haddon House, Ashton-on-Mersey, black gelding, **Black Prince**, foaled 1909, bred by — Hickling, Adbolton, Nottingham ; s Mathias (6473), d Princess Clare (12227), s d Garton Duke of Connaught.

## Class 24.—*Pony, not exceeding* 13.2 *hands, suitable for, and ridden by, a child not over* 14 *years of age. on the second day of Show.* [7 entries.]

**I.** (**£5.**)—Reggie Pitt, Bear Inn, Hylton Road, Worcester, bay gelding, **Picton Lad**, 6 years.

**II.** (**£3.**)—Miss M. Hemus, Wood House, Wichenford, Worcester, grey gelding, **Silver Tail**, foaled 1910.

**III.** (**£1.**)—T. Molesworth, The Conigree, Ledbury, bay gelding, **Dainty Boy.**

**R.**—H. E. Powell, Upper Wick, Worcester, dark chestnut gelding, **Devon,** foaled 1910.

**H.C.**—F. H. Unwin, Longdon Hall, near Tewkesbury, cream, **Meringue,** aged.—S. Martin, The Firs, Whittington, Worcester, black gelding, **Sambo,** bred by F. W. G. G. Williams, Bredenbury Court, Herefordshire.

**C.**—Miss A. J. Lindner, The Conigree, Ledbury, bay gelding, **Billy Buttons** ; s Starlight.

## Class 25.—*Mare or Gelding, over* 14.2 *and under* 15 *hands, driven in harness on the third day of Show.* [6 entries.]

**I.** (**£10.**)—P. Smith, Haddon House, Ashton-on-Mersey, bay mare, **Melbourne Princess,** foaled 1907, bred by W. Cliff, Melbourne Hall, York ; s Merry Wildfire (9342), d Melbourne Duchess (14571).

**II.** (**£5.**)—A. Collier, 86, Victoria Park Road, South Hackney, N.E., chestnut mare, **Duchess of Heron Gate** (22489), foaled 1907 ; s His Majesty (2513), d Lady Delightful (20419), s d Royal Danegelt (5785).

**III.** (**£2.**)—J. and F. Wardell, 269, Ladywood Road, Edgbaston, Birmingham, chestnut mare, **Woodhatch Silver Bells,** foaled 1910, bred by — Evans, Woodhatch Stud ; s Polonius (4931), d Ring o' Bells (12255), s d Goldfinder 6th (1791).

CLASS 26.—*Trotting. Best Mare, Stallion or Gelding, under* 15 *hands, for speed, driven in harness on the third day of Show.* [2 entries.]

**I.** (**£10.**)—A. COLLIER, 86, Victoria Park Road, South Hackney, N.E., chestnut mare, **Duchess of Heron Gate.**

CLASS 27 —*Team of two horses with waqon, the property of a Farmer, to be shown in harness on the fourth day of Show—First prize,* £10—*second,* £5—*third,* £2.

[NO ENTRY.]

CLASS 28.—*Cart Mare or Gelding, the property of a Farmer or Tradesman, driven regularly by himself or his servants for a period of not less than three months prior to the date of Show. To be shown in trade cart on the fourth day of Show. First prize,* £5—*second,* £2—*third,* £1.

[NO ENTRY.]

CLASS 29.—*Light Mare or Gelding, the property of a Farmer or Tradesman, driven regularly by himself or his servants for a period of not less than three months prior to the date of Show. To be shown in trade cart on the fourth day of Show.* [4 entries.]

**I.** (**£5.**)—R. BELCHER, High Street, West Bromwich, **Nomination.**

**II.** (**£2.**)—T. NASH, 17, St. Peter Street, Hereford, chestnut gelding, **Mustard.**

**III.** (**£1.**)—J. AND F. WARDELL, 269, Ladywood Road, Edgbaston, Birmingham, chestnut mare, **Woodhatch Silver Bells.**

**R.**—W. A. EWINS, Radford, Inkberrow, Worcester, roan mare, **Primrose,** foaled 1907.

CLASS 30.—*Mare or Gelding, not over* 13.2 *hands, driven in harness on the fifth day of Show.* [5 entries.]

**I.** (**£10.**)—W. W. BOURNE, Garston Manor, Watford, Herts, bay mare, **Bricket Bauble,** 8 years, bred by Sir G. Greenall, Bart., Walton Hall, Warrington; s Berkeley Claudius, s d Warrener.

**II.** (**£5.**) R. BELCHER, High Street, West Bromwich, bay mare, **Berkeley Princess.**

**III.** (**£2.**)—S. JACOBSON, 51, Stafford Street, Longton, Staffs, bay gelding, **Mel Valley Fashion,** foaled 1908; s Sir Horace.

CLASS 31.—*Trotting. Best Mare, Stallion, or Gelding,* 15 *hands or over, for speed, driven in harness on fifth day of Show.* [3 entries.]

**I.** (**£10.**)—W. WINANS, Claridge's Hotel, London, bay mare, **Nancy Clancy.**

**II.** (**£5.**)—W. WINANS, mare, **Nomination.**

## *MEDAL.*

### OFFERED BY THE HACKNEY HORSE SOCIETY.

*A Silver Medal for the best Mare or Gelding exhibited in Single Harness in Classes* 21 *to* 31, *subject to Conditions* 50.

**I.**—W. W. BOURNE, Garston Manor, Watford, Herts, bay mare, **Bricket Bauble.**

## JUMPING.

CLASS 32.—*Mare or Gelding,* 15 *hands and over, jumping over the course in the best form on the first day of Show.* [17 entries.]

**I.** (**£10.**)—T. GLENCROSS, The Loose Box, Weston-super-Mare, bay mare, **Blink Bonny.**

**II.** (**£5.**)—T. GLENCROSS, bay gelding, **Nomination 2nd.**

**III.** (**£2.**)—T. GLENCROSS, bay gelding, **Nomination.**

**R.**—T. MOLESWORTH, The Conigree, Ledbury, Herefordshire, black gelding, **Black Prince.**

CLASS 33.—*Mare or Gelding, under* 15 *hands, jumping over the course in the best form on the first day of Show.* [7 entries.]

**I.** (**£10.**)—J. NORBURY, Heathside, Knutsford, grey gelding, **Peacock.**

**II.** (**£5.**)—MRS. J. P. GLENCROSS, The Lodge, Battenhall, Worcester, bay gelding, **Ormond Boy.**

**III.** (**£2.**)—S. PHELPS, Churcham, Gloucester, bay gelding, **Laddie.**

CLASS 34.—*Mare or Gelding,* 15.3 *hands and over, jumping over the course in the best form on the second day of Show.* [13 entries.]

**I.** (**£10.**)—T. GLENCROSS, The Loose Box, Weston-super-Mare, bay gelding, **Nomination 2nd.**

**II.** (**£5.**)—J. P. GLENCROSS, The Lodge, Battenhall, Worcester, bay gelding, **Micky.**

**III.** (**£2.**)—T. AND W. SINGER, High House Farm, Corsley, Wilts, chestnut gelding, **Springbok.**

**R.**—L. J. PEASE, Tiverton, Tarporley, Cheshire, grey gelding, **Snowball.**

CLASS 35.—*Mare or Gelding, under* 15.3 *hands jumping over the course in the best form on the third day of Show.* [12 entries.]

**I.** (**£10.**)—T. GLENCROSS, The Loose Box, Weston-super-Mare, bay gelding, **Nomination.**

**II.** (**£5.**)—J. NORBURY, Heathside, Knutsford, grey gelding, **Peacock.**

**III.** (**£2.**) S. PHELPS, Churcham, Gloucester, bay gelding, **Laddie.**

CLASS 36.—*Mare or Gelding,* 15 *hands and over, jumping over the course in the best form on the third day of Show.* [17 entries.]

**I.** (**£10.**)—MRS. J. P. GLENCROSS, The Lodge, Battenhall, Worcester, chestnut, **Why Not.**

**II.** (**£5.**)—J. S. C. DAVIES, The Moreton, Bredon, Tewkesbury, black or brown gelding, **Artist.**

**III.** (**£2.**)—W. D. GRUNDY, Tan House Farm, Upper Wick, Worcester, grey mare, **Nomination.**

CLASS 37.—*Mare or Gelding, under* 15 *hands, jumping over the course in the best form on the third day of Show.* [7 entries.]

**I.** (**£10.**)—W. D. GRUNDY, Tan House Farm, Upper Wick, Worcester, black mare, **Stratford Lass.**

**II.** (**£5.**)—J. NORBURY, Heathside, Knutsford, grey gelding, **Peacock.**

**III.** (**£2.**)—S. PHELPS, Churcham, Gloucester, bay gelding, **Laddie.**

CLASS 38.—*Mare or Gelding, jumping highest on the fourth day of Show.* [12 entries.]

**I.** (**£10.**)—F. V. GRANGE, Alvaston, Nantwich, Cheshire, gelding, **Burgo.**

**II.** (**£5.**)—T. GLENCROSS, The Loose Box, Weston-super-Mare, bay gelding, **Nomination 2nd**

**III.** (**£2.**)—T. AND W. SINGER, High House Farm, Corsley, Wilts, chestnut gelding, **Springbok.**

CLASS 39.—*Mare or Gelding, any height, jumping over the course in the best form on the fourth day of Show.* [24 entries.]

**Equal I.** (**£6.**)—T. GLENCROSS, The Loose Box, Weston-super-Mare, bay mare, **Blink Bonny.**

**Equal I.** (**£6.**)—T. AND W. SINGER, High House Farm, Corsley, Wilts, grey gelding, **Tiny White.**

**II.** (**£5.**)—T. GLENCROSS, bay gelding, **Nomination.**

CLASS 40.—*Mare or Gelding jumping highest on the fifth day of Show.* [13 entries.]

**I.** (**£10.**)—T. AND W. SINGER, High House Farm, Corsley, Wilts, chestnut gelding, **Springbok.**

**II.** (**£5.**)—J. P. GLENCROSS, The Lodge, Battenhall, Worcester, **Nomination.**

**III.** (**£2.**)—S. PHELPS, Churcham, Gloucester, bay gelding, **Laddie.**

## *CHAMPION CLASS.*

CLASS 41.—*Mare or Gelding, any height, having won a Prize in Classes 32 to 40, jumping over the course in the best form on the fifth day of Show.* [20 entries.]

*(In this Class the whole of the Jumps were raised at the discretion of the Stewards.)*

**I. (£15.)**—T. GLENCROSS, The Loose Box, Weston-super-Mare, bay gelding; **Nomination 2nd.**

**II. (£5.)**—MRS. J. P. GLENCROSS, The Lodge, Battenhall, Worcester, bay gelding, **Ormond Boy.**

**R.**—J. NORBURY, Heathside, Knutsford, grey gelding, **Peacock.**

*Extra Class for Mare or Gelding, any height.* [14 entries.]

**I. (£10.)**—MRS. J. P. GLENCROSS, The Lodge, Battenhall, Worcester, bay gelding, **Ormond Boy.**

**II. (£5.)**—T. GLENCROSS, The Loose Box, Weston-super-Mare, bay gelding, **Nomination 2nd.**

**III. (£2.)**—F. V. GRANGE, Alvaston, Nantwich, Cheshire, gelding, **Burgo.**

# CATTLE

## DEVON.

(£10 towards the prizes in Classes 42 to 48 were contributed by the Devon Cattle Breeders' Society.)

CLASS 42.—*Devon Cow, in-Milk, calved before* 1912. [1 entry.]

**I. (£10.)**—C. MORRIS, Highfield Hall, St. Albans, Herts, **Weston Goodmaid** (26086), born 11th May, 1911, bred by W. Tuckett, Stockleigh Pomeroy, Crediton, Devon; s Cronje (5470), d Goodmaid (21763), s d Capton Harold (4728).

CLASS 43.—*Devon Heifer, in-Milk, calved in* 1912.—[1 entry.]

**I. (£10.)**—C. MORRIS, Highfield Hall, St. Albans, Herts, **Highfield Charmer** (26055), born 10th April; s Holcombe Rufus (7149), d Whimple Beauty 3rd (19570), s d Hestercombe Redlight (4417).

### CLASS 44.—*Devon Heifer, calved in* 1913. [2 entries.]

**I. (£10.)**—C. MORRIS, Highfield Hall, St. Albans, Herts, **Highfield Countess 4th** (26918), born 4th January; s Capton Bellringer (4911), d Highfield Countess 2nd (23719), s d Pound Bellringer (5617).

**II. (£5.)**—CAPTAIN SIR G. A. H. WILLS, BART., M.P., Northmoor, Dulverton, **Northmoor Prudence** (27228), born 11th March; s Northmoor Royal Mail (7210), d Cothelstone Proof (23511), s d Rufus (5370).

### CLASS 45.—*Devon Heifer, calved in* 1914. [1 entry.]

**I. (£10.)**—C. MORRIS, Highfield Hall, St. Albans, Herts, **Highfield Charity 3rd**, born 26th January; s Holcombe Reminder (7413), d Highfield Charity 2nd (25236), s d Pound Lord Brassey 5th (5622).

### CLASS 46.—*Devon Bull, calved in* 1911 *or* 1912—*First prize,* £10—*second,* £5—*third,* £2.

[NO ENTRY.]

### CLASS 47.—*Devon Bull, calved in* 1913. [2 entries.]

**I. (£10.)**—C. MORRIS, Highfield Hall, St. Albans, Herts, **Highfield Conqueror** (8099), born 23rd January; s Nadrid Conquerer (7470), d Highfield Favourite (24483), s d Pound Lord Brassey 5th (5622).

**II (£5.)**—LORD POLTIMORE, Court Hall, North Molton, North Devon, **Gotten Prince 2nd** (Vol. xxxvii.), born 23rd January, bred by J. Thorne, Gotten, West Monkton, Taunton, Somerset; s Blackguard (6622), d Princess 1st, s d Pound Lord Brassey 2nd (4651).

### CLASS 48.—*Devon Bull, calved in* 1914. [4 entries.]

**I. (£10.)**—LORD POLTIMORE, Court Hall, North Molton, North Devon, **Town Lord** (Vol. xxxviii.), born 9th March, bred by J. W. Bussell, Town Farm, Gittisham, Honiton, Devon; s Monster (7200), d Lofty 3rd (26480), s d Hestercombe Dairyman (6104).

**II. (£5.)**—C. MORRIS, Highfield Hall, St. Albans, Herts, **Clampit Gauge,** born 14th January, bred by W. Brent, Clampit, Callington, Cornwall; s Lord Plumper (7381), d Clampit Gaylass 4th (24060), s d Lovely's Duke (6145).

**III. (£2.)**—Captain Sir G. A. H. WILLS, BART., M.P., Northmoor, Dulverton, **Northmoor Prizetaker,** born 26th March; s Northmoor Monarch (7807), d Tottie (21136), s d Chairman (4362).

**R.**—C. MORRIS, **Highfield Reminder,** born 17th January; s Holcombe Reminder (7413), d Highfield Farthing 2nd (22890), s d Pound Bellringer (5617).

## SOUTH DEVON.

### CLASS 49.—*South Devon Cow or Heifer, in-milk, calved in or before* 1912. [6 entries.]

**I. (£10.)**—B. LUSCOMBE, Bowden, Yealmpton, born, 2nd January, 1909; s Challenger (1823), d Fidget 4th (6615).

**II.** (**£5.**)—W. AND H. WHITLEY, Primley Farm, Paignton, **Worswell Gladys 2nd** (11380), born 12th January, 1912, bred by N. S. Chaffe & Son, Worswell Barton, Revelstoke, Plymouth; s Masher's Duke (2679), d Gladys (5408), s d Juryman (1165).

**III.** (**£2.**)—PAGE AND WHITLEY, Warren Farm, Broughton, near Chester, **Princess 4th** (8708), born 16th February, 1908, bred by J. E. Skinner, Staverton, Ashburton, South Devon; s Sunshine (2514), d Princess 2nd (5602), s d Big Ben (1593).

**R.**—B. BUTLAND, Leigham, Plympton, **Beauty 17th** (9760), born 8th October, 1910; s Henry 7th (3178), d Beauty 9th (6385), s d Leigham Champion (1667).

### CLASS 50.—*South Devon Heifer, calved in* 1913. [2 entries.]

**I.** (**£10.**)—PAGE AND WHITLEY, Warren Farm, Broughton, near Chester, **Mayflower** (13534), born 10th May, bred by H. Worth, Jun., Pool Mill Farm, Newton Ferrers, Plymouth; s Merafield Paymaster (3491), d Daffodil 2nd (7151), s d Dorothy's Happy Jack (2116).

### CLASS 51.—*South Devon Heifer, calved in* 1914. [6 entries.]

**I.** (**£10.**)—F. B. MILDMAY, M.P., Flete, Ivybridge, **Lilian's Maid**, born 28th January; s Doncaster (3720), d Lilian (10164), s d Henry 8th (3179).

**II.** (**£5.**)—W. AND H. WHITLEY, Primley Farm, Paignton, **Primley Haidee,** born 15th April, bred by G. Coaker, Old Newnham, Plympton; s Stancombe Lad 2nd (3588), d Norah (6420), s d Robert (1735).

**III.** (**£2.**)—W. AND H. WHITLEY, **Primley Harmony,** born 20th January; s General (4061), d Primley Daffodil (10467), s d Reindeer (2213).

**R.**—F. B. MILDMAY, M.P., **Countess 1st,** born 29th January; s Sexton Peer (3897), d Cherry 4th (7235), s d Widland Hero (2798).

### *SPECIAL PRIZE.*

OFFERED BY CHARLES A. HANSON, ESQ., FOWEY HALL, CORNWALL, ALDERMAN OF THE CITY OF LONDON.

*A Challenge Cup for the best Cow in-Milk, in the South Devon Classes, to be won three times in succession or four times altogether, before becoming the property of the winner.*

**I.**—B. LUSCOMBE, Bowden, Yealmpton, born 2nd January, 1909.

### *SPECIAL PRIZE.*

OFFERED BY THE SOUTH DEVON HERD BOOK SOCIETY.

*A Silver Medal for the best Exhibit in Classes* 49 *to* 51.

**I.**—B. LUSCOMBE, Bowden, Yealmpton, born 2nd January, 1909.

### CLASS 52.—*South Devon Bull, calved in* 1911 *or* 1912. [3 entries.]

**I. (£10.)**—W. AND H. WHITLEY, Primley Farm, Paignton, **Primley Excelsior,** born 2nd April, 1911 ; s What I Wanted (1388), d Coquette (6374), s d Babland Boy (1793).

**II. (£5.)**—PAGE AND WHITLEY, Warren Farm, Broughton, near Chester, **Primley Fossicker** (4534), born 20th May, 1912, bred by W. and H. Whitley, Primley, Paignton ; s What I Wanted (1388), d Lovely (6380), s d Babland Boy (1793).

**III. (£2.)**—W. AND H. WHITLEY, **General** (4061), born 4th April, 1911, bred by J. and H. Rossiter, South Huish, Kingsbridge ; s Henry 4th (3175), d Pickle (6179), s d Duke (1433).

### CLASS 53.—*South Devon Bull, calved in* 1913. [3 entries.]

**I. (£10.)**—A. ROGERS, Brownstone, Yealmpton, **Brownstone Laddie,** born 4th January ; s Pastime (3837), d Pimpernel (6364), s d Marmaduke (1488).

**II. (£5.)**—W. AND H. WHITLEY, Primley Farm, Paignton, **Offields Monarch** (5002), born 15th May, bred by R. H. Luscombe and Sons, Offields, Churchstow, Kingsbridge ; s Coarsewell Gay Boy (3390), d Actress 8th (9188), s d Ruler (3028).

**III. (£2.)**—B. LUSCOMBE, Bowden, Yealmpton, born 22nd January ; s Leigham Sort (3198), d May Girl (8524), s d Marquis.

### CLASS 54.—*South Devon Bull, calved in* 1914. [2 entries.]

**I. (£10.)**—B. LUSCOMBE, Bowden, Yealmpton, **Cherry King 2nd,** born 15th February ; s Cherry King (4318), d May Girl (8524), s d Marquis.

**II. (£5.)**—B. BUTLAND, Leigham, Plympton, Devon, **Leigham Pride,** born 8th January ; s Worswell Gladiator (4257), d Beauty 18th (10565), s d Henry 7th (3178).

### *SPECIAL PRIZE.*

### OFFERED BY THE SOUTH DEVON HERD BOOK SOCIETY.

*A Silver Medal for the best Exhibit in Classes* 52 *to* 54.

**I.**—A. ROGERS, Brownstone, Yealmpton, **Brownstone Laddie,** born 4th January.

## SHORTHORN.

**(The 1st Prize in Class 55 and a Silver Medal to the Breeder of the Winner, were offered by the Shorthorn Society, and the 1st Prize in Class 56 by the Dairy Shorthorn (Coates's Herd Book) Association.)**

### CLASS 55.—*Pedigree Shorthorn Dairy Cow, in-Milk, four years old and upwards on May 20, eligible for, and entered in Coates's Herd Book, or Pedigree sent for such entry previous to the Show,*

*and not having previously won a similar prize offered by the above-named Society or Association in* 1915, *milked in the ring before judging under Conditions* 61. [10 entries.]

**I.** (**£10.**)—R. Silcock and Sons, Thornton Hall, Farm, Poulton-le-Fylde, roan, **Fylde Valentine,** born 23rd February, 1909; s Abbotsford 5th (75981), d Valentine 17th (Vol. liii, P1137), s d Earl of Ava (76582). (Last calf 21st April, 1915).

**II.** (**£5.**)—C. R. W. Adeane, Babraham, Cambridge, red, **Babraham Constance,** born 24th March, 1909; s Babraham Nero (94099), d Babraham Countess Clara, s d Prince Pericles 24th (86953).

**R.**—C. R. W. Adeane, red, **Babraham Countess Clara,** born 28th October, 1906; s Prince Pericles 24th (86953), d Babraham Countess 2nd, s d Edwin (70370).

**H.C.**—J. H. Large, Crudwell Manor, Malmesbury, roan, **Lily Maid 2nd,** born 15th October, 1910; s Prince Butterfly (106568), d Lily Maid, s d Prince 13th (92871).

Class 56.—*Pedigree Shorthorn Dairy Cow, in-Milk, under four years old on May* 20, *eligible for, and entered in Coates's Herd Book, or pedigree sent for such entry previous to the Show, and not having previously won a similar prize offered by the above-named Society or Association in* 1915, *milked in the ring before judging, under Conditions* 61. [12 entries.]

**I.** (**£10.**)—C. R. W. Adeane, Babraham, Cambridge, red and little white, **Sandford Empress 7th,** born 14th March, 1913, bred by the late Lord Rothschild, Tring Park, Herts; s Foundation Stone (105524), d Sand Empress 5th, s d Driver (85789). (Last calf 22nd April, 1915).

**II.** (**£5.**)—F. H. S. Perkins, Hadnock Court, Monmouth, red and little white, **Hadnock Charming Lass 3rd,** born 1st April, 1912, bred by H. F. Perkins, Wyecroft, Monmouth; s Dean Prince (111499), d Charming Lass 12th, s d Royal Prince (73536), Vol. liv., p. 1020). (Last calf 30th June, 1914).

**R.**—R. Silcock and Sons, Thornton Hall Farm, Poulton-le-Fylde, roan, **Fylde Seraphine 2nd,** born 28th June, 1911; s Babraham Bridegroom (94088), d Saxon Truthful (Vol. liii., page 1,153), s d Scottish King (77824). (Last calf 3rd June, 1914).

**H.C.**—J. H. Large, Crudwell Manor, Malmesbury, roan, **Crudwell Red Wing,** born 23rd November, 1912; s Barton Jeweller (110957), d Red Wing, s d Challenge (70121).

**C.**—J. H. Large, roan, **Crudwell Rosy Vale,** born 6th October, 1912; s Forest Duke (108639), d Rosy 3rd, s d Challenge (70121).

Class 57.—*Shorthorn Cow in-Milk, calved before* 1912. [5 entries.]

**I.** (**£10.**)—W. M. Cazalet, Fairlawne, Tonbridge, roan, **Cairncosh Jilt,** born 28th January, 1907; bred by A. Grassick, Cairncosh, Tullynessle, Alford; s Prince James (89670), d Jilt 42nd (Vol. lv., p. 378), s d Courier (85676).

**II.** (**£5.**)—R. J. BALSTON, Bilsington Priory, Asford, Kent, roan, **Cumberland Orphan,** born 30th April, 1907; s Choir Boy (91238), d Jubilee Bella (Vol. lii., p. 914), s d Scottish Victor (90068).

**III.** (**£2.**)—J. PRATT, Lickhill and Wood Green, Stourport, red, **Lickhill Countess 3rd,** born 30th April, 1910; s Conqueror (98441), d Countess of Clive 3rd, s d Alston Lark (85155). (Last calf 18th June, 1914).

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents of that Society resident in Herefordshire or Worcestershire.*

*Best Exhibit in Class* 57.

(**£5.**)—J. PRATT, Lickhill and Wood Green, Stourport, red, **Lickhill Countess 3rd,** born 30th April, 1910.

## CLASS 58.—*Shorthorn Heifer, calved in* 1912. [9 entries.]

**I.** (**£10.**)—W. M. CAZALET, Fairlawne, Tonbridge, roan, **Butterfly 64th,** born 5th April, bred by G. Watson, Old Craig, Wartle; s Lord Advocate (106009), d Butterfly 55th (Vol. liii., p. 779), s d Sir Edon (87376).

**II.** (**£5.**)—W. M. CAZALET, red roan, **Lady Ramsden 3rd,** born 16th May, bred by R. W. Hill, Balthayock, Perth; s Balthayock Baronet (107758), d Lady Ramsden (Vol. lix., p. 748), s d Proud Favourite (84420).

**III.** (**£2.**)—E. SMITH and R. J. MOORE, 111, Bransford Road, Worcester, roan, **Frost 153rd,** born 12th January, bred by R. S. Arkell, Fox Farm, Stow-on-the-Wold; s Macbeth (109303), d Frost 105th, s d Royal Oak (77747).

**R.**—G. GERRARD, Offerton Farm, Hindlip, Worcester, roan, **Dolly Dowke 27th** (Vol. lix.), born 20th February; s Merry Lorn (103046), d Dolly Dowke 13th, s d Ranbury Musician (73348).

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

*Best Exhibit in Class* 58.

**I.** (**£5.**)—E. SMITH AND R. J. MOORE, roan, **Frost 153rd.**

**R.**—G. GERRARD, roan, **Dolly Dowke 27th** (Vol. lix).

## CLASS 59.—*Shorthorn Heifer, calved in* 1913. [12 entries.]

**I.** (**£10.**)—HIS MAJESTY KING GEORGE V., The Royal Farms, Windsor, roan, **Windsor Gem,** born 10th February; s Proud Jubilant (106637), d Matilda, s d Marcus (89233).

**II.** (**£5.**)—W. M. Cazalet, Fairlawne, Tonbridge, roan, **Fairlawne Clipper Queen,** born 3rd May; s Willie Campbell (104406), d Elvetham Clipper 3rd (Vol. lvi., p. 547), s d Lavender Royal (86380).

**III.** (**£2.**)—R. J. Balston, Bilsington Priory, Ashford, Kent, red, **Blythesome 39th,** born 16th January; s Bilsington Favourite (107898), d Blythsome 36th (Vol. lix., p. 528), s d Choir Boy (91238).

**R.**—The Earl of Powis, Powis Castle, Welshpool, **Powysland Snowdrop,** born 6th April; s Beaufort Speciality (110980), d Powysland Gem (Vol. lvii., p. 1,070), s d Mealsgate Victor.

**H.C.**—H. Miller, Church Farm, Great Sutton, Chester, roan, **Sutton Augusta 2nd,** born 10th February, bred by F. Miller, La Belen, Clifton Road, Birkenhead; s Prospector,.d Lady Augusta, s d Cornish Knight.

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Exhibit in Class* 59.

**I.** (**£5.**)—A. Dyke, Greenhayes, Westmancote, Tewkesbury, red and little white, **Village Jewel,** born 22nd January, bred by W. T. Garne and Son, Aldsworth, Northleach, Glos.; s Village Beau (87631), d Ablington Belle, s d Village Diamond (10981).

## Class 60.—*Shorthorn Heifer, calved in* 1914. [13 entries.]

**I.** (**£10.**)—The Lady Grantley, Red Rice, Andover, Hants, roan, **Frost Flower,** born 17th March, bred by Sir J. Horlick, Bart., Cowley Manor; s Adbolton Prince (97770), s Frost Duchess (Vol. lix., p. 770), s d Roving Minstrel.

**II.** (**£5.**)—R. J. Balston, Bilsington Priory, Ashford, Kent, dark roan, **Bilsington Lady Tarves 12th,** born 27th January; s Edgcote Falcon (111674), d Lady Tarves 12th (Vol. lii., p. 1,093), s d Newton Jupiter (96200).

**III.** (**£2.**)—S. F. Edge, Gallops Homestead, Ditchling, Sussex, roan, **Queen Augusta 2nd,** born 22nd February, bred by W. H. Hicks, Upton Downs, Burford, Oxon; s Windsor Lad (113735), d Queen Augusta (Vol. lviii., p. 646), s d Burcott King (104920).

**R.**—The Earl of Powis, Powis Castle, Welshpool, roan, **Powysland Roan Lady,** born 18th January, bred by F. Hornby, Lilleshall, Newport, Salop; s Knapton Premier (109098), d Plum Blossom (Vol. lvii., p. 834), s d Master Bates 2nd (99565).

**H.C.**—W. M. Cazalet, Fairlawne, Tonbridge, roan, **Fairlawne Clara,** born 18th April; s Willie Campbell (104406), d Clara 9th (Vol. lvii., p. 436), s d Round Robin (100394).

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Exhibit in Class* 60.

**I.** (**£5.**)—J. B. Brooks, Finstall Park, Bromsgrove, red roan, **Finstall Laura 3rd** (Vol. lxi.), born 18th March, bred by Exhibitor; s Marechal Niel (116461), d Finstall Honeysuckle, s d Pinkney Victor (89556).

**R.**—E. Smith and R. J. Moore, 111, Bransford Road, Worcester, roan, **Badminton Musical,** born 25th July, bred by H. Butler, Badminton, Glos., s Badminton Paganini (110843), d Musical 127th, s d Near Go (79473).

## Class 61.—*Shorthorn Bull, calved in* 1911 *or* 1912. [10 entries.]

**I.** (**£10.**)—H. Miller, Church Farm, Great Sutton, Chester, roan, **Gainford Royal Champion,** born 1st April, 1912, bred by G. Harrison, Gainford Hall, Darlington, Durham; s Collynie Champion, d Tehidy Royal Dickson 4th, s d Shamrock.

**II.** (**£5.**)—F. B. Wilkinson, Cavendish Lodge, Edwinstowe, roan, **Spency Champion,** born 25th July, 1912; s Netlaw Phœnix, d Spency Maid, s d Hartforth Alms.

**III.** (**£2.**)—R. J. Balston, Bilsington Priory, Ashford, Kent, roan, **Bilsington Intrepid,** born 9th April, 1912; s Tehidy Robin Hood (97420), d Dorris 7th (Vol. liv., p. 956), s d Golden Drop Pride (83595).

**R.**—R. Guilding, Bushley Park, near Tewkesbury, roan, **Gay Boy** (115515), born 4th May, 1912, bred by W. Parkin-Moore, Whitehall, Mealsgate, Cumberland; s Keep Smiling (105835), d Cherry Empress, s d White Emperor (97670).

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Exhibit in Class* 61.

**I.** (**£5.**)—R. Guilding, Bushley Park, near Tewkesbury, roan, **Gay Boy** (115515).

**R.**—G. Gerrard, Offerton Farm, Hindlip, Worcester, roan, **Vanity** (113602 H.B. rep.), born 30th April, 1911, bred by E. Jones, Manoravon, Llandilo, Camarthen; s Village Prince (107383), d Vain Lady, s d Derrye Mason (91466).

## Class 62.—*Shorthorn Bull, calved in* 1913. [14 entries.]

**I.** (**£10.**)—His Majesty King George V., The Royal Farms, Windsor, red, **Royal Gold** (122611), born 30th January; s Proud Jubilant (106637), d Golden Fairy, s d Winsome Lad (82648).

**II.** (**£5.**)—F. B. Wilkinson, Cavendish Lodge, Edwinstowe, Newark, roan, **Morning Star,** born 28th May; s Rath Cardigan (107079), d Red Duchess, s d Wells (93844).

**III.** (**£2.**)—C. E. Gunther, Tongswood, Hawkhurst, Kent, roan, **Tongswood Benedict,** born 19th May; s Bold Broadhooks (111102), d Strawberry Dame, s d Prince Benedict (86904).

**R.**—W. Spurr, Wexham, Anderby, Alford, Lincs., roan, **Wexham Beau,** born 21st March; s Royal Beau (113135), d Wexham Lady 2nd, s d Pearl Clipper (103297).

**H.C.**—E. W. Bishop, Fifield, Oxford, roan, **Chance,** born 18th January; s Hampton Broadhooks, d Fanny Fifield, s d Yorton Knight.

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Exhibit in Class* 62.

**I.** (**£5.**)—J. B. Brooks, Finstall Park, Bromsgrove, red and little white, **Bapton Councillor** (118786), born 22nd July, bred by J. D. Willis, Bapton Manor; s Newbliss Augusta's Champion (112637), d Countess 6th, s d Ladas 2nd (79175).

**R.**—A. Dyke, Greenhayes, Westmancote, Tewkesbury, dark roan, **Reform** (122405), born 16th April, bred by W. Parkin-Moore, Whitehall, Mealsgate, Cumberland; s Referendum (109882), d Whitehall Clematis, s d Newton Crystal (92658).

## Class 63.—*Shorthorn Bull, calved in* 1914. [11 entries.]

**I.** (**£10.**)—E. W. Bishop, Fifield, Oxford, roan, **First Choice,** born 20th January; s Bampton Broadhooks, d Sherborne Rose, s d Sherborne Archduke.

**II.** (**£5.**)—C. E. Gunther, Tongswood, Hawkhurst, Kent, red, **Sanquhar Pilot,** born 1st March, bred by Messrs. Law, Mains of Sanquhar, Torres, N.B.; s Sanquhar Dreadnought, d Lady Dorothy 56, s d Hawthorn Champion (99098)

**III.** (**£2.**)—The Lady Grantley, Red Rice, Andover, Hants, roan, **Cranham Royalist,** born 13th January; s Border Favourite (107976), d Stella (Vol. lvii., p. 419), s d Evander (95106).

**R.**—J. A. K. Falconer, Calmsden Manor, Cirencester, roan, **Secret Sentry,** born 23rd February; s Nonpareil Sceptre (116770), d Sentiment, s d Scottish Pearl (87294).

## *SPECIAL PRIZE.*

*Offered by the Herefordshire and Worcestershire Agricultural Society, and open only to residents in the counties of Hereford and Worcester who were members of that Society.*

### *Best Exhibit in Class* 63.

**I.** (**£5.**)—B. Ashwin, Littleton Pastures, Evesham, red, **Chedlow Crown,** born 5th January, bred by H. Baker, Chedlow, Malmesbury; s Misrule (109241), d Bianca Belle 3rd (Vol. lvii.), s d Bapton Crown (78288).

**R.**—A. Dyke, Greenhayes, Westmancote, Tewkesbury, red, **Peter Pan,** born 27th April; s Field Pride (115395), d Cotehay Spicy Lass, s d Spicy Champion (104019).

## *CHAMPION PRIZE.*

OFFERED BY THE SHORTHORN SOCIETY, WITH SILVER MEDAL TO THE BREEDER.

### *Best Bull in Classes* 61 *to* 63 *entered in, or eligible for entry in, Coates's Herd Book.*

(**£10.**)—H. Miller, Church Farm, Great Sutton, Chester, roan, **Gainford Royal Champion.**

**R.**—His Majesty King George V., red, **Royal Gold** (122611).

## HEREFORD.

### Class 64.—*Cow, in-Milk, calved before* 1912. [1 entry.]

**I.** (**£10.**)—W. B. Tudge, Stepaside, Onibury, Shropshire, **Arabis,** born 22nd January, 1910, bred by J. D. D. Evans, Brecon; s Linacre (26257), d Arabella (Vol. xli., p. 376), s d Sulla (25806).

### Class 65.—*Hereford Heifer, in-Milk, calved in* 1912. [4 entries.]

**I.** (**£10.**)—E. Smith and R. J. Moore, 111, Bransford Road, Worcester, **Miss Vera,** born 29th March, bred by W. H. Davies, Claston, Dormington, Hereford; s Nabob (26324), d Fairtrade, s d Obelisk (21637).

**II.** (**£5.**)—H. R. Evans, Court of Noke, Pembridge, Herefordshire; **Ranunculus,** born 7th February; s Marcus (27003), d Rowena (Vol. xliv., p. 402, H.H.B.), s d Gilderoy (20653).

**R.**—W. H. Depper, Dean Park, Tenbury, **Lady John,** born 18th January, bred by A. Tanner, Shrawardine, Shrewsbury; s Shraden Wizard (28718), d Lady John 7th (Vol. xli., p. 765), s d Major Domo (20179).

### Class 66.—*Hereford Heifer, calved in* 1913. [7 entries.]

**I.** (**£10.**)—K. W. Milnes, Stanway Manor, Church Stretton, **Stanway Gem,** born 11th January; s Sir James (26489), d Gemima 4th, s d Merryman (24158).

**II.** (**£5.**)—F. Bibby, Hardwicke Grange, Shrewsbury, **Clive Iris 3rd,** born 1st January; s Coup-de-Ore (29016), d Clive Iris 2nd (Vol. xlv., p. 322), s d Clive Spangle 2nd (Vol. xlv., p. 323).

**III.** (**£2.**)—Exors. of J. L. Hall, Lulham, Madley, Hereford, **Miss Gordon,** born, 20th January, bred by R. O. Rees, Braddws, Three Cocks, R.S.O., Brecon; s Gamecock (26145), d Countess (40439), s d Royal Bage (25738).

**R.**—W. Jones, Llanthomas Farm, Llanigon, Hay, **Lorna Doone,** born 18th January; s Protestant (27124), d Broadward-Lotty, s d Twyford-Landmark.

**H.C.**—W. H. B. Cave, Wall End, Monkland, Leominster, **Wall End Dora,** born 13th March; s Cross Belt (27470), d Begonia (Vol. xliv., p. 300), s d Field-Marshal (23429).

**C.**—W. H. Depper, Dean Park, Tenbury, **Good Girl,** born 1st January, bred by T. Morris, Weston Court, Pembridge; s Weston Speculator (29453), d Gossip (Vol. xlii., p. 706), s d Sentry (27215).—J. Rowlands, Evesbatch Court, Bishops Frome, near Worcester, **Lava,** born 10th January; s Carbine (28132), d Lavinia, s d Tumbler (17588).

## Class 67.—*Hereford Heifer, calved in* 1914. [12 entries.]

**I.** (**£10.**)—A. E. Hughes, Wintercott, Leominster, **Pictavia,** born 15th January; s Panbula (29260), d Pricota, s d Lucus (27673).

**II.** (**£5.**)—D. A. Thomas, Llanwern Park, Newport, **Pin Money,** born 3rd January; s Candidate (24465), d Pincushion, s d First Fiddle (26856).

**III.** (**£2.**)—F. F. Mason, The Faraam, Killay, Glamorgan, **Faraam Oxeye,** born 17th January; s Bonny Bert (28910), d Opponent (Vol. xliii., p. 799), s d Prince Charles (23681).

**R.**—K. W. Milnes, Stanway Manor, Church Stretton, **Stanway Rarity 2nd,** born 1st February; s British Oyster (28950), d Burcot Charming, s d Robber King (25717).

**H.C.**—F. Bibby, Hardwicke Grange, Shrewsbury, **Clive Lady 4th,** born 5th January; s Crusader (26038), d Proud Lady (Vol. xliv., p. 252), s d Proud Lad (20941).

## Class 68.—*Hereford Bull, calved in* 1911 *or* 1912. [3 entries.]

**I.** (**£10.**)—T. L. Walker, Ankerdine, Knightwick, Worcester, **Court Card,** born 15th January, 1912, bred by A. P. Turner, The Leen, Pembridge, Herefordshire; s Montezuma, d Claribel, s d Mortimer.

**II.** (**£5.**)—W. B. Tudge, Stepaside, Onibury, Shropshire, **Renown,** born 6th January, 1912, bred by G. H. Bray, Dormington, Hereford; s Cornice (25253), d Rubelle (Vol. xxxviii., p. 797), s d Royal Rupert (20976).

**III.** (**£2.**)—R. T. Hinckes, Mansel Court, Mansel Lacy, Hereford, **Sancho,** born 12th April, 1912; s Morning Glory, d Sensible 3rd, s d Lucifer.

## Class 69.—*Hereford Bull, calved in* 1913. [9 entries.]

**I.** (**£10.**)—de F. Pennefather, M.P., Kinnersley Castle, Herefordshire, **Ringleader 2nd** (30966), born 2nd January; s Newton Edward (28523), d Ringlet (Vol. xxxvii., p. 731), s d Baronet (20456).

**II.** (**£5.**)—C. T. Pulley, Lower Eaton, Hereford, **Eaton Peer,** born 16th January; s Buckland Topper (28113), d Ashleaf 2nd, s d Eaton Champion (21351).

**III.** (**£2.**)—H. J. DENT, Perton Court, Stoke Edith, Hereford, **Perton Loyalist** (30893), born 19th February; s Time Test (26529), d Lively 28th (Vol. xli., p. 351), s d Peer (18006).

**R.**—G. BUTTERS, Hill House, Newton, Leominster, **Newton Albion** (30816), born 4th January; s Baronet (28875), d Gaylass 2nd (Vol. xliv., p. 293), s d Sailor Prince (26465).

**H.C.**—THE EARL OF COVENTRY, Croome Court, Worcester, **Dollar,** born 6th February; s Ivington Bright (28380), d Dolly (Vol. xl., p. 333), s d Earl Marshal (22106).

**C.**—F. F. MASON, The Faraam, Killay, Glamorgan, **Faraam Archie,** born 26th January; s Avondale (28867), d Mimosa (Vol. xliv., p. 619), s d Surprise (25810)

### CLASS 70.—*Hereford Bull, calved in* 1914. [17 entries.]

**I.** (**£10.**)—H. MOORE, Shucknall Court, Hereford, **Shucknall Monarch,** born 13th January; s Prince Charming (29982), d Blanche 8th (Vol. xliii., p. 556), s d Perry Prince (24856).

**II.** (**£5.**)—SIR F. CAWLEY, BART., M.P., Berrington Hall, Leominster, **Berrington King,** born 15th January; s Berrington Ringer, d Raindrop, s d Rainbow.

**III.** (**£2.**)—THE EARL OF COVENTRY, Croome Court, Worcester, **Galway,** born 2nd March; s Dollymount (27500), d Galloon (Vol. xxxviii., p. 360), s d Fairy King (21380).

**R.**—A. E. HUGHES, Wintercott, Leominster, **Luckington,** born 16th January; s Panbula (29260), d Lady Brenda, s d Lucus (27673).

**H.C.**—SIR J. R. G. COTTERELL, BART., Garnons, Hereford, **Meteor,** born 20th February; s Comet (28175), d Ladybank, s d Happy Go Lucky (25422). —F. F. MASON, The Faraam, Killay, Glamorgan, **Faraam Bacchus,** born 3rd February; s Bonny Bert (28910), d Gay Lass (Vol. xl., p. 379), s d Pyon Gauntlet (24910).

**C.**—W. H. D. DAVIES, Pigeon House, Weston Beggard, Hereford, **Merry Monarch,** born 27th January, bred by P. W. Taylor, Birchend, Ledbury; s Royal Sovereign (30050), d Suffragette (Vol. xlvi.), s d Marathon (27000).

(The Prizes in Classes 71 to 76 were offered by the Herefordshire and Worcestershire Agricultural Society, and were open only to members of that Society.

### CLASS 71.—*Hereford Heifer, calved in* 1913 (*novice*).* [6 entries.]

**I.** (**£7.**)—EXORS. OF J. L. HALL, Lulham, Madley, Hereford, **Miss Gordon.**

**II.** (**£4.**)—W. JONES, Llanthomas Farm, Llanigon, Hay, **Lorna Doone,** born 18th January.

**III.** (**£2.**)—J. MOSS, Eaton Hall, Leominster, **Curly 60th,** born 29th January; s Vern Lucifer (28802), d Curly 57th (Vol. xliv., p. 675), s d Newton Tumbler (24813).

**R.**—W. H. B. CAVE, Wall End, Monkland, Leominster, **Wall End Dora.**

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* NOVICE QUALIFICATION.—Exhibitors who had not, within the last 10 years, won a First Prize in the Hereford Cattle Classes at the Royal (Shrewsbury, 1914, excepted), Bath and West and Southern Counties, or the Open Classes at the Herefordshire or Worcestershire Agricultural Society's Shows.

## CLASS 72.—*Hereford Heifer, calved in* 1914 (*novice*). [8 entries.]

**I.** (**£7.**)—F. F. MASON, The Faraam, Killay, Glamorgan, **Faraam Oxeye.**

**II.** (**£4.**)—S. WILLCOX, The Grange, Bosbury, Ledbury, **Turquoise,** born 13th January; s Barograph (28014), d Trim (Vol. xliii., p. 806), s d Perton General (24864).

**III.** (**£2.**)—F. F. MASON, The Faraam, Killay, Glamorgan, **Faraam Tossie,** born 19th January; s Marcus (27003), d Theresa (Vol. xlii., p. 484), s d Sir Roland (26494).

**R.**—S. WILLCOX, **Pomeroy**, born 5th January; s Barograph (28014), d Pippin (Vol. xlii., p. 962), s d Black Pearl (21956).

## *CHAMPION PRIZES.*

### OFFERED BY THE HEREFORD HERD BOOK SOCIETY.

### *Best Cow or Heifer in Classes* 64 *to* 67 *and* 71 *and* 72.

— (**£10.**)—K. W. MILNES, Stanway Manor, Church Stretton, **Stanway Gem,** born 11th January.

**R.**—A. E. HUGHES, Wintercott, Leominster, **Pictavia,** born 15th January.

## CLASS 73.—*Hereford Bull, Cow and their Offspring.* [2 entries.]

**I.** (**£10.**)—W. B. TUDGE, Stepaside, Onibury, Shropshire, Cow, **Arabis,** born 22nd, January, 1910, and Bull, **Renown,** born 6th January, 1912.

**II.** (**£5.**)—H. A. CHRISTY, Llangoed Castle, Breconshire. Bull, **Alfonso** (27993), born 28th January, 1910, bred by H. R. Evans, Court of Noke, Stounton-on-Arrow, Herefordshire; s Albatross (19193), d Molly (Vol. xxxv., p. 307), s d Manager (19580); Cow, **Lemon Peel** (Vol. xli., p. 816), born 10th March, 1906, bred by W. T. Barnaby, Saltmarshe Castle, Bromyard, Herefordshire; s Rougemont (20296), d Lemon Sponge (Vol. xxxviii., p. 257), s d General Buller (20648); and Offspring, born 1st March, 1915; s Alfonso (27993), d Lemon Peel (Vol. xli., p. 816), s d Rougemont (20296).

## CLASS 74.—*Hereford Bull, calved on or after March* 1*st*, 1914. [5 entries.]

**I.** (**£10.**)—W. GRIFFITHS, Alder's End, Tarrington, Hereford, **Ringer,** born 16th March; s Starlight (28754), d Ringlet, s d Change Ringer (22478).

**II.** (**£5.**)—SIR J. R. G. COTTERELL, BART., Garnons, Hereford, **Troubadour,** born 1st March; s Administrator (27298), d Ladylove, s d Old Sort (24826).

**III.** (**£2.**)—H. J. DENT, Perton Court, Stoke Edith, Hereford, **Perton Defender** (Vol. xlvi.), born 22nd March; s Time Test (26529), d Lively 42nd (Vol. xxxviii., p. 664), s d Whitfield Roberts (21880).

### CLASS 75.—*Hereford Bull, calved in* 1914 (*novice.*).* [2 entries.]

**I.** (**£10.**)—F. F. MASON, The Faraam, Killay, Glamorgan, **Faraam Bacchus,** born 3rd February.

**II.** (**£5.**)—W. H. D. DAVIES, Pigeon House, Weston Beggard, **Merry Monarch,** born 27th January.

## *CHAMPION PRIZE.*

### OFFERED BY THE HEREFORD HERD BOOK SOCIETY.

### *Best Bull in Classes* 68 *to* 70 *and* 73 *to* 75.

**I.** (**£10.**)—T. L. WALKER, Ankerdine, Knightwick, Worcester, **Court Card,** born 15th January, 1912.

**R.**—W. B. TUDGE, Stepaside, Onibury, Shropshire, **Renown,** born 6th January, 1912.

### CLASS 76.—*Hereford Steer, calved in* 1914. [3 entries.]

**I.** (**£7.**)—de F. PENNEFATHER, M.P., Kinnersley Castle, Herefordshire, born 2nd January; s Ringmaster (28640), d Belle (Vol. xli., p. 624), s d Pembridge Captain (23044).

**II.** (**£4.**)—D. A. THOMAS, Llanwern Park, Newport, born 1st March; Tramp (28785), d Betty Hood, s d Robin Hood (21721).

**III.** (**£2.**)—de F. PENNEFATHER, M.P., born 7th February; s Ringmaster (28640), d Bonny Lass 3rd (Vol. xxxix., p. 624), s d Bage Protector (21167).

## SUSSEX.

### CLASS 77.—*Sussex Cow or Heifer, in-Milk, calved in or before* 1912. [2 entries.]

**I.** (**£10.**)—J. GROVES, Browning's Manor, Blackboys, Sussex, **Ashburnham Bloom** (11647), born 12th October, 1908, bred by Earl of Ashburnham, Ashburnham Park, Battle, Sussex; s Limehurst Sailor (2035), d Ashburnham Bloom (9138), s d Bewbush Nobleman 3rd (1853).

**II.** (**£5.**)—W. T. FREMLIN, Milgate Park, Maidstone, **Milgate Rosebud,** born 7th January, 1911; s Birling Chris (2482), d Rosebud 7th (8873), s d Milgate 2nd (1688).

### CLASS 78.—*Sussex Heifer, calved in* 1913 *or* 1914. [2 entries.]

**I.** (**£10.**)—W. T. FREMLIN, Milgate Park, Maidstone, **Milgate Blossom 2nd,** born 18th January, 1913; s Tutsham Nero (2911), d Brockhill Mayblossom 2nd (12292), s d Evegate Prince (2235).

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* NOVICE QUALIFICATION.—Exhibitors who had not, within the last 10 years, won a First Prize in the Hereford Cattle Classes at the Royal (Shrewsbury, 1914, excepted), Bath and West and Southern Counties, or the Open Classes at the Herefordshire and Worcestershire Agricultural Society's Shows.

**II. (£5.)**—J. GROVES, Browning's Manor, Blackboys, Sussex, **Gaiety Girl 17th** (15309), born 12th April, 1913, bred by G. Ward, Tutsham, West Farleigh, Kent; s The Beau (2546), d Gaiety Girl 6th (8648), s d Tutsham Squire (1722).

## *CHAMPION PRIZE.*

### OFFERED BY THE SUSSEX HERD BOOK SOCIETY.

*A Silver Medal for the best Cow or Heifer in Class* 77 *or* 78.

**I.**—J. GROVES, Browning's Manor, Blackboys, Sussex, **Ashburnham Bloom** (11647).

**R.**—W. T. FREMLIN, **Milgate Blossom 2nd.**

### CLASS 79.—*Sussex Bull, calved in* 1912, 1913, *or* 1914—*First prize,* £10—*second,* £5—*third,* £2.

[NO ENTRY.]

## *CHAMPION PRIZE.*

### OFFERED BY THE SUSSEX HERD BOOK SOCIETY.

*A Silver Medal for the best Bull in Class* 79.

[NO ENTRY.]

## ABERDEEN-ANGUS.

(The 1st Prize in Class 80 was offered by the English Aberdeen-Angus Cattle Association.)

### CLASS 80.—*Aberdeen-Angus Cow or Heifer, in-Milk, calved before December* 1, 1912. [6 entries.]

**I. (£10.)**—J. J. CRIDLAN, Maisemore Park, Gloucester, **Tulip of Standen** (45122), born 23rd February, 1909, bred by the late Captain Cookson, Chute Standen, Wilts; s Elector of Benton (21814), d Crocus of Standen (37038), s d Elberton (20435).

**II. (£5.)**—E. A. WIGAN, Conholt Park, Andover, Hants, **Tuberose of Standen,** born 8th January, 1908, bred by the late Captain F. Cookson, Chute Standen, Andover, Hants; s Elector of Benton (21814), d Rose of Standen (28095), s d Justinhaugh (13550).

**III. (£2.)**—A. W. B. HAWKINS, Stagenhoe Park, Welwyn, Herts, **Pride 3rd of Ruthven** (49285), born 2nd March, 1911, bred by A. D. Macrea, Ruthven, Kingussie, Inverness-shire; s Earl Echo of Ballindalloch (26706), d Pride 14th of Tullynally (28761), s d General of Abergeldie (12548).

**H.C.**—J. H. BRIDGES, Langshott, Horley, Surrey, **Pride of Twyford** (39994), born 17th March, 1906, bred by the late T. H. Bainbridge, Eshott Hall, Felton, Northumberland; s Idelamere (22036), d Pride of Tullynally 10th (27152), s d General of Abergeldie (12548).

### CLASS 81.—*Aberdeen-Angus Heifer, calved on or after December* 1, 1912. [2 entries.]

**I. (£10.)**—J. H. Bridges, Langshott, Horley, Surrey, **Flora of Langshott 2nd** (52009), born 4th January, 1913 ; s Eland of Ballindalloch (24329), d Flower 26th of Stricken (41321), s d Idealist (206047).

**II. (£5.)**—J. J. Cridlan, Maisemore Park, Gloucester, **Proud Mabel of Maisemore** (52171) ; s Brave Briton of Maisemore (30218), d Mabel Pride 2nd of Theakston (44174), s d Examiner of Selaby (19107).

### CLASS 82.—*Aberdeen-Angus Heifer, calved on or after December* 1, 1913. [9 entries.]

**I. (£10.)**—J. J. Cridlan, Maisemore Park, Gloucester, **Jilt 3rd of Maisemore** (54035), born 28th February, 1914 ; s Peer of Maisemore (33597), d Jilt 2nd of Maisemore (46866), s d Everwise (24436).

**II. (£5.)**—J. H. Bridges, Langshott, Horley, Surrey, **Burstow Maid** (53836), born 13th December, 1913 ; s Gardafui of Ballindalloch (31967), d Bandon Maid (43373), s d Edward 7th (19022).

**III. (£2.)** —J. H. Bridges, **Roving Queen** (53844), born 22nd January, 1914 ; s Gardafui of Ballindalloch (31967), d Rosy Queen 5th of Skegby (33331), s d Count Fluster (16406).

**H.C.**—A. W. B. Hawkins, Stagenhoe Park, Welwyn, Herts, **Pandora of Stagenhoe** (54530), born 4th January, 1914 ; s Hayston Black Enamel (33275), d Burn Pandora (49326), s d Kaptan (27027).

**C.**—J. J. Cridlan, **Elace of Maisemore** (54027), born 27th December, 1913 ; s Brave Briton of Maisemore (30218), d Elaine of Maisemore (45180), s d Idelard of Maisemore (26970).

### CLASS 83.—*Aberdeen-Angus Bull, calved before December* 1, 1913. [5 entries.]

**I. (£10.)**—J. J. Cridlan, Maisemore Park, Gloucester, **Everard 2nd of Maisemore,** born 3rd April, 1911 ; s Rubelate of Maisemore (28706), d Ever green 13th (38736), s d Wizard of Maisemore (21465).

**II. (£5.)**—C. Thellusson, Broadworth Hall, Doncaster, **Everon of Maisemore,** born 4th December, 1911, bred by J. J. Cridlan, Maisemore Park, Gloucester ; s Esland of Maisemore, d Evergreen 22nd, s d Idle Lord.

**III. (£2.)**—C. T. Scott, Buckland Manor, Broadway, Worcester, **Password of Benton,** born 7th February, 1913, bred by C. Stephenson, Balliol College Farm, Long Benton, Newcastle-on-Tyne ; s Prince of Jesters, d Pure Pride of Knockanbuie, s d Prince Edric of Auchorachan.

### CLASS 84.—*Aberdeen-Angus Bull, calved on or after December* 1, 1913. [7 entries.]

**I. (£10.)**—J. J. Cridlan, Maisemore Park, Gloucester, **Idyll of Maisemore** (36219), born 6th January, 1914 ; s Peer of Maisemore (33597), d Tulip of Standen (45122), s d Elector of Benton (21814).

**II.** (**£5.**)—J. H. Bridges, Langshott, Horley, Surrey, **Beynon** (35537), born 24th December, 1913; s Gardafin of Ballindalloch (31967), d Beddington Maid (43374), s d Edward 7th (19022).

**III.** (**£2.**)—J. J. Cridlan, **Proud Peer of Maisemore,** born 8th March, 1914; s Peer of Maisemore (33597), d Pride of Maisemore 6th (43510), s d Wizard of Maisemore (21465).

**C.**—A. W. B. Hawkins, Stagenhoe Park, Welwyn, Herts, **Black Baron of Dalmeny** (35548), born 29th December, 1913, bred by Earl of Rosebery, Dalmeny House, Edinburgh; s Prince Buller (27336), d Barbette of Careston (43185), s d Benedictine (25318).

## *CHAMPION PRIZES.*

### Offered by the Aberdeen-Angus Cattle Society.

*A Gold Medal, value* £10, *for the best Animal in Classes* 80 *to* 84.

**I.**—J. J. Cridlan, Maisemore Park, Gloucester, **Tulip of Standen** (45122).

**R.**—J. J. Cridlan, **Everard 2nd of Maisemore,** born 3rd April, 1911.

### Offered by the English Aberdeen-Angus Cattle Association.

*A Silver Medal for the best Animal of opposite Sex to that awarded the Gold Medal in Classes* 80 *to* 84.

**I.**—J. J. Cridlan, **Everard 2nd of Maisemore.**

**R.**—J. J. Cridlan, **Idyll of Maisemore** (36219).

## JERSEY

### Class 85.—*Jersey Cow, in-Milk, calved before* 1912. [18 entries.]

**I.** (**£10.**)—Mrs. Evelyn, Wotton House, Dorking, Surrey, broken, **Wissy Maiden,** born 25th April, 1907, bred by C. P. Messervy, Trinity, Jersey; s Combination (8845), d Wissy (8637, F.H.S.C.).

**II.** (**£5.**)—Miss E. M. Enderby, Beckington, Bath, whole, **Noirmont Beauty,** born 25th June, 1909, bred by J. P. Amy, St. Brelade's; s Johnny (4135), d Noirmont Belle (13503), s d Nestor (3563).

**III.** (**£2.**)—C. Thellusson, Brodsworth Hall, Doncaster, fawn, **Arcadia,** born August, 1909, bred by Lady Rothschild, Aston Clinton; s Stormer (9431), d Amberoid 3rd, s d General Wonder (8891).

**R. & V.H.C.**—Lady Wernher, Luton Hoo, Luton, whole, **Carlsbad,** born 4th December, 1907; s King Henry (8571), d Cutnow, s d Bismarck's Boy (6786).

### Class 86.—*Jersey Cow or Heifer, in-Milk, calved in* 1912. [9 entries.]

**I.** (**£10.**)—W. M. Cazalet, Fairlawne, Tonbridge, broken, **Pricota,** born 21st January, bred by P. F. Le Riche, St. Lawrence's, Jersey; s Western King (11198), d Kitty Marsh 2nd, s d Pride's Golden Lad (9033).

**II.** (**£5.**)—A. Miller-Hallet, Goddington, Chelsfield, Kent, whole, **Indispensable 2nd,** born 11th January, bred by J. W. Journeaux, Jersey ; s Golden Fern's Noble (4572), d Indispensable (14275), s d Vandyke (3866).

**III.** (**£2.**)—H. Walker, Beach, Bitton, Glos., broken, **Fairy Queen Fern,** born 22nd March, bred by the Asylum Committee, St. Saviour's, Jersey ; s Golden Fern's Noble (4570), d Fairy 3rd, s d Forfarshire (2914).

**R. & V.H.C.**—J. H. Smith-Barry, Stowell Park, Pewsey, broken, **Foxbane,** born 22nd September ; s Brer Fox (10869), d Foxglove, s d Silver Fox (10097).

**V.H.C.**—Lady Wernher, Luton Hoo, Luton, whole, **Ibsen's Merry,** born 3rd March, bred by Mr. C. Hotten, Jersey ; s Ibsen's Boy (4616), d Merry Queenie, s d Royal Lad (5060).

**H.C.**—Lady Wernher, whole, **May Queen 4th,** born 20th May ; s China's Fairy Boy (9869), d May Queen, s d King Henry (8571).

## Class 87.—*Jersey Heifer, in-Milk, calved in or since* 1913. [12 entries.]

**I.** (**£10.**)—J. H. Smith-Barry, Stowell Park, Pewsey, grey fawn, **Masquerade,** born 15th February ; s Redruth (10407), d Marionette, s d Gay Boy (7510).

**II.** (**£5.**)—A. Miller-Hallett, Goddington, Chelsfield, Kent, broken, **Goddington Flower 4th,** born 9th April ; s Golden Chance's Noble (10256), d Young Winks 4th (Vol. xx., p. 459), s d Flower's Hero (3502).

**III.** (**£2.**)—Mrs. Evelyn, Wotton House, Dorking, Surrey, whole, **Wotton Custard,** born 11th April ; s Layman (9667), d Wotton Easter Egg (Vol. xxiii., p. 444), s d Mourier's Sultan (10014).

## Class 88.—*Jersey Heifer, calved in* 1914. [13 entries.]

**I.** (**£10.**)—A. Miller-Hallett, Goddington, Chelsfield, Kent, broken, **Goddington Petune 2nd,** born 3rd March ; s Golden Chance's Noble (10256), d Petune's Baby (14961), s d Benedictine's Boy (3989).

**II.** (**£5.**)—Miss E. M. Enderby. Beckington, Bath, whole, **Beckington Charmer,** born 2nd April, ; s Beckington Champion, d My Grisette 3rd, s d Broadlands' Boy.

**III.** (**£2.**)—Mrs. Evelyn, Wotton House, Dorking, Surrey, whole, **Wotton g,** born 11th April ; s Yeovil Lad (10833), d Wotton Easter Egg (Vol. xxiii., p. 444), s d Mourier's Sultan (10014).

**R. & V.H.C.**—Mrs. Evelyn, **Wotton Souffle,** born 22nd May ; s Yeovil Lad (10833), d Wotton Omelette (Vol. xxv., p. 502), s d Pavillon's Noble (10035).

**V.H.C.**—Miss E. M. Enderby, whole, **Beckington Grace,** born 20th April ; s Financial Baron, d Graceful Beauty.

**H.C.**—Lady Wernher, Luton Hoo, Luton, whole, **Fairness,** born 7th February ; s China's Fairy Boy, d Neatness 10th, s d Harvester (8546).

**C.**—C. Thellusson, Brodsworth Hall, Doncaster, fawn, **Brodsworth Daphne ;** s Wink's Noble, d Brodsworth May, s d Goddington Bluebeard.

### CLASS 89.—*Jersey Bull, calved in* 1911 *or* 1912. [4 entries.]

**I.** (**£10.**)—W. D. KNIGHT, Rapkyns, Horsham, Sussex, whole, **La Maitrerie Lad** (11393), born 4th December, 1911, bred by Napper and Francis, St. Martin's, Jersey; s Welcome Lad 2nd (10824), d Avalanche Daisy (13796 P.S.C.), s d Hussy Lad (8555).

**II.** (**£5.**)—H. WALKER, Beach, Bitton, Glos., black, **Pallas Noble,** born 14th March, 1911, bred by N. du Feu, jun., Jersey; s Noble of Oaklands (3909), d Pallas 2nd, s d Sovereign (2834).

### CLASS 90.—*Jersey Bull, calved in* 1913. [2 entries.]

**I.** (**£10.**)—MISS E. M. ENDERBY, Beckington, Bath, whole, **Myrtle's Hero,** born 18th April, bred by W. Syveet, jun., St. Ouen's; s Royal Guide, d Myrtle's Pride.

**II.** (**£5.**)—MRS. EVELYN, Wotton House, Dorking, Surrey, broken, **Red Cloud,** born 21st February, bred by J. H. Smith-Barry, Stowell Park, Pewsey, Wilts; s Red Ruth (10407), d Post Obit 25th (435), s d Dracon's Lad (10586).

### CLASS 91.—*Jersey Bull, calved in* 1914. [12 entries.]

**I.** (**£10.**)—MRS. EVELYN, Wotton House, Dorking, Surrey, broken, **Wotton Pesagus,** born 26th May; s Ottalie's Chancellor (11481), d Wotton Parquerette 24th (47), s d Illustrious (10289).

**II.** (**£5.**)—W. D KNIGHT, Rapkyns, Horsham, Sussex, whole, **Rapkyns Viceroy** (Vol. xxvi.), born 7th May; s La Maitrerie Lad (11393), d Coronation Belle (Vol. xxv., p. 303), s d Jolly Dick (9645).

**III.** (**£2.**)—A. MILLER-HALLETT, Goddington, Chelsfield, Kent, whole **Goddington Chance 2nd,** born 17th January; s Golden Chance's Noble (10256), d Cream Bread 2nd (14450), s d Picton (3840).

**R. & H.C.**—MISS E. M. ENDERBY, Beckington, Bath, whole, **Beckington Fortune's Noble,** born 8th April; s Noble Lad, d Favour's Fortune, s d Black Bob.

## GUERNSEY.

(£20 towards the Prizes in the Guernsey Classes were contributed by the English Guernsey Cattle Society.)

### CLASS 92.—*Guernsey Cow, in-Milk, calved before* 1912. [9 entries.]

**I.** (**£10.**)—F. P. BARLOW, Lynchmere House, Haslemere, light red, **Rosy de les Mauxmarquis,** born 16th March, 1903, bred by A. Robert, MauxMarquis, Guernsey.

**II.** (**£5.**)—H. F. PLUMPTRE, Goodnestone Park, Canterbury, Kent, fawn and white, **Polly of La Croix 10th** (8679), born 9th February, 1910; s Golden Noble (1930), d Polly of La Croix 8th (7041), s d Suzerain (1252).

**III.** (**£2.**)—J. F. REMNANT, The Grange, Twyford, Berks, fawn and white, **Donnington Jane,** born 14th November, 1909, bred by A. C. Harriss, Donnington Manor, Chichester, Sussex; s Lord Howe of Warren Wood, d Donnington Beauty.

**R. & H.C.**—MRS. JERVOISE, Herriard Park, Basingstoke, fawn and white, **Nora 8th of Les Houards** (10233), born 16th January, 1908, bred by F. G. Heaume, Les Houards, Forest, Guernsey; s Golden Hero of l'Etiennerie (1507 P.S.), d Nora of Les Houards (2071 F.S.).

**C.**—MRS. HERBERT OF CLYTHA, Clytha Park, Abergavenny, fawn and white, **Merton Ginella 6th** (7770), born 26th December, 1906, bred by W. J. Empson, Merton Grange, Gamlingay, Cambs.

## CLASS 93.—*Guernsey Heifer, in-Milk, calved in* 1912. [7 entries.]

**I. (£10.)**—H. F. PLUMPTRE, Goodnestone Park, Canterbury, Kent, fawn and white, **Butterwort 9th** (9342), born 25th April; s Fleur-de-Lys 4th (2135), d Butterwort 8th (8383), s d Moss Raider (1871).

**II. (£5.)**—J. F. REMNANT, M.P., The Grange, Twyford, Berks, fawn and white, **Romana 49th,** born 15th February, bred by S. Flower, Stanstead Bury, Ware, Herts; s Lennard 2nd, d Romana 26th.

**III. (£2.)**—SIR E. HAMBRO, K.C.Q.O., Milton Abbey, Blandford, Dorset, light red, **Rosette 2nd of Eturs Lodge**, born 15th February, bred by J. N. Ozanne, Eturs Lodge, Castel, Guernsey; s Osseo 4th (2412), d Rosette of Eturs Lodge (4489 F.S.).

**R. & V.H.C.**—MRS. F. COOKSON, Chute Standen, Andover, Hants, fawn, **Polly of Standen 2nd** (9615), born 30th January; s Warden King (2213), d Polly of Standen 1st (8204), s d Fleur-de-Lys (1675).

**H.C.**—A. W. B. HAWKINS, Stagenhoe Park, Welwyn, Herts, fawn and white **Rowanberry 8th** (9678 E.G.H.B.), born 23rd February, bred by Mrs. J. E. Ellis, Wrea Head, Scalby, York; s Broom Flower 4th (2231 E.G.H.B.), d Rowanberry (4968 E.G.H.B.), s d Waldo 2nd (1170 E.G.H.B.).

## CLASS 94.—*Guernsey Heifer, calved in* 1913. [7 entries.]

**I. (£10.)**—MRS. JERVOISE, Herriard Park, Basingstoke, light red and white, **Rose 3rd of School Lane Farm** (10304), born 18th March, bred by G. H. Froome, School Lane Farm, St. Martin's, Guernsey; s Hector of les Mesurier (2733 P.S.), d Rose of School Lane Farm (4185 F.S.).

**II. (£5.)**—J. F. REMNANT, M.P., The Grange, Twyford, Berks, fawn, **Budget's Jessie of the Vrangue,** born 13th April, bred by J. Sherwell, La Vrangue, St. Peter's Port, Guernsey; s Sequel's Budget, d Jessie 8th of the Vrangue.

**III. (£2.)**—A. W. B. HAWKINS, Stagenhoe Park, Welwyn, Herts, red and white, **Stagenhoe Daisy 1st**, born 6th February; s Merton Reliance (2338 E.G.H.B.), d Kingsmoor Daisy 17th (8134 E.G.H.B.), s d Kingsmoor Governor (1952 E.G.H.B.).

**R. & H.C.**—MRS. R. C. BAINBRIDGE, Elfordleigh, Plympton, South Devon, orange, fawn and white, **Trequean Maggie 2nd** (10402), born 11th February, bred by W. Penrose, Trequean, Breage, Cornwall; s Godolphin Arthur (1664), d Trequean Maggie (8291), s d Hunguits Royal (1944).

**H.C.**—J. C. FORSTER, Clatford Mills, Andover, red and white, **Clatford Sonrisa** (9904), born 15th March, bred by Major de la Condamine, Havilland Hall, Guernsey; s Raymond of la Croix (2692 P.S.), d Primrose of the Hall (4746 F.S.).

## CLASS 95.—*Guernsey Heifer, calved in* 1914. [7 entries.]

**I. (£10.)**—MRS. W. H. PALMER, Murrell Hill, Binfield, Berks, fawn, **Murrell Citron,** born 2nd September; s Hayes Fido 2nd (2460), d Citron 22nd (8009), s d Champion of the Bourg (1808).

**II. (£5.)**—MRS. JERVOISE, Herriard Park, Basingstoke, fawn and white, **Herriard Phyllis,** born 16th June; s Trengwainton Corporal, d Godolphin Phillis 5th.

**III. (£2.)**—J. F. REMNANT, M.P., The Grange, Twyford, Berks, fawn and white, **Stagenhoe Broom,** born 26th January, bred by A. W. B. Hawkins, Stagenhoe Park, Welwyn, Herts; s Stagenhoe Smart Boy, d Lemsford Broom.

**R. & H.C.**—J. C. FORSTER, Clatford Mills, Andover, red and white, **Clatford Meadow Sweet 5th,** born 13th June; s Clatford Adonis (2573), d Clatford Meadow Sweet 2nd (8401).

**H.C.**—MRS. W. H. PALMER, fawn, **Murrell Loyal,** born 16th April; s Hayes Fido 2nd (2460), d Hayes Loyal 5th (9002), s d Gay Boy (2020).

**C.**—MRS. L. CORBETT, Hockley House, Alresford, Hants, lemon and white, **Hockley Susan,** born 27th April; s Pensioner, d Lake Snowdrop, s d Rollo.

## CLASS 96.—*Guernsey Bull, calved in* 1911 *or* 1912. [5 entries.]

**I. (£10.)**—F. P. BARLOW, Lynchmere House, Haslemere, fawn and white, **Roberts' Boy's Sequel** (2496), born 21st March, 1911, bred by J. Le Page, Castel, Guernsey; s Roberts' Boy (2275 R.G.A.S.), d Flossie of Naptiaux (2461 R.G.A.S.).

**II. (£5.)**—MRS. JERVOISE, Herriard Park, Basingstoke, orange and white, **Trengwainton Corporal** (2528), born 10th October, 1911, bred by T. R. Bolitho, Trengwainton, Cornwall; s The Major (2195), d Godolphin Ida 3rd (7652).

**III. (£2.)**—SIR E. HAMBRO, K.C.V.O., Milton Abbey, Blandford, Dorset, fawn, **Milton Hubert** (2799), born 13th June, 1912, bred by A. K. Parsons, King's Mills, Castel, Guernsey; s Sequel's Delight (2442 P.S.), d Parson's Snowdrop (3152 F.S.).

**R. & V.H.C.**—MRS. W. H. PALMER, Murrell Hill, Binfield, fawn, **Lake Jolly Boy** (2613), born 11th February, 1912, bred by V. Smith, Lake Farm, Bishopstoke, Hants; s Itchen Royalist (2156), d Lake Jessica (6585), s d Nonpariel (1504).

## CLASS 97.—*Guernsey Bull, calved in* 1913. [8 entries.]

**I. (£10.)**—H. F. PLUMPTRE, Goodnestone Park, Canterbury, Kent, fawn and white, **Lord Royal 4th** (2789), born 18th August; s Lord Royal 3rd (2480), d Golden Muriel (8979), s d Golden Casket (2138).

**II. (£5.)**—F. P. BARLOW, Lynchmere House, Haslemere, fawn and white, **Lynchmere Lord Roberts 2nd** (2794), born 5th June; s Roberts' Roy's Sequel (2496 E.G.H.B.), d Clatford Meadow Sweet (8013 E.G.H.B.), s d Chieftain (62 R.A.A.S.).

**III. (£2.)**—MRS. R. C. BAINBRIDGE, Elfordleigh, Plympton, South Devon, orange, fawn and white, **Royalty 9th** (2848), born 2nd May, bred by Miss Bailie Hamilton, Burly Lodge, Hants; s Royalty 7th, d Violet of de Quartiers 7th, s d Deputy of de Quartiers 2nd.

**R. & V.H.C.**—F. P. BARLOW, lemon and white, **Clara's Pearl King** (2716), born 13th June, bred by E. P. Mahy, Maple Lodge, Vale, Guernsey: s Raymond's Pearl King (2560 R.G.A.S.), d Clara 16th of the Rouvets (5476 R.G.A.S.).

**V.H.C.**—J. F. REMNANT, M.P., The Grange, Twyford, Berks, fawn and white, **Dene Dandy,** born 12th March; s Honfleur of Migrove, d Lady 97th.

### CLASS 98.—*Guernsey Bull, calved in* 1914. [11 entries.]

**I.** (**£10.**)—MRS. JERVOISE, Herriard Park, Basingstoke, orange and white, **Herriard Governor,** born 21st March; s Governor of the Chene, d Nora 8th of les Houards.

**II.** (**£5.**)—SIR E. HAMBRO, K.C.V.O., Milton Abbey, Blandford, Dorset, **Milton Cherub 1st**; s Hayes Cherub 3rd (2595), d Lynchmere Queen of the May 3rd.

**III.** (**£2.**)—MRS. W. H. PALMER, Murrell Hill, Binfield, Berks, fawn, **Murrell Fido,** born 16th March; s Hayes Fido 2nd (2460), d Ashburnham Slavey (8823), s d Noble of La Ruette (2344).

**R. & V.H.C.**—H. F. PLUMPTRE, Goodnestone Park, Canterbury, Kent, fawn and white, **Golden Noble 9th,** born 20th August; s Golden Noble (1930), d Donnington Juno (8041), s d Lord Howe of Warren Wood (1962).

**H.C.**—J. F. REMNANT, M.P., The Grange, Twyford, Berks, fawn and white, **Stagenhoe Signet 4th,** born 14th April, bred by A. W. B. Hawkins, Stagenhoe Park, Welwyn, Herts: s Merton Signet 5th, d Primula of Blunham.

**C.**—A. W. B. HAWKINS, Stagenhoe Park, Welwyn, Herts, fawn and white, **Stagenhoe Charmant 4th,** born 4th June; s Charmant 4th of the Grou (2124 E.G.H.B.), d Tempsford Beauty (7111 E.G.H.B.).

## KERRY.

### CLASS 99.—*Kerry Cow or Heifer, in Milk, calved in or before* 1912—*First prize,* £10—*second,* £5—*third,* £2.

[NO ENTRY.]

### CLASS 100.—*Kerry Heifer, calved in* 1913 *or* 1914—*First prize,* £10—*second,* £5—*third,* £2.

[NO ENTRY.]

### CLASS 101.—*Kerry Bull, calved in* 1912, 1913, *or* 1914—*First prize,* £10—*second,* £5—*third,* £2.

[NO ENTRY.]

## DEXTER.

### CLASS 102.—*Dexter Cow or Heifer, in-Milk, calved in or before* 1912. [7 entries.]

**I.** (**£10.**)—H. M. GIBBS, Barrow Court, Flax Bourton, black, **Barrow Buttercup 2nd,** born 4th June, 1909; s Barrow Count (383), d Barrow Buttercup (1676).

**II.** (**£5.**)—H. M. Gibbs, black, **Barrow Bee 2nd,** born 26th August, 1910; s Barrow Captain (393), d Barrow Bee (1335).

**III.** (**£2.**)—E. P. Peyton, Woodcote Lodge, near Kenilworth, black, **Pulcinella** (2155), born 29th March, 1910; s Gort Hero 2nd (547), d Gort Fancy 3rd (1760), s d Gort Punch (526).

**R.**—Mrs. Leatham, The Manor, Bagendon, Cirencester, black, **Brenda,** born 30th May, 1911; s Peppercorn, d Little Brenda.

### Class 103.—*Dexter Heifer, calved in* 1913 *or* 1914. [9 entries.]

**I.** (**£10.**)—B. de Bertodano, Cowbridge House, Malmesbury, Wilts, black, **Cowbridge Enid 2nd** (Vol. xiv., p. 60), born 25th February, 1913; s Cowbridge Hero (H.B. 465), d Cowbridge Enid (H.B. 1751).

**II.** (**£5.**)—His Majesty the King, Sandringham, black, **Kidmore Sally,** born 15th January, 1914: s Jack Robin, d Kidmore Stella, s d Oliver (513).

**III.** (**£2.**)—H. M. Gibbs, Barrow Court, Flax Bourton, black, **Barrow Flirt 4th,** born 11th May, 1914; s Barrow Orphan (498), d Barrow Flirt (1681).

**R.**—Rev. T. W. Hudson, Great Shefford Rectory, Lambourne, Berkshire, black, **Cayenne,** born 25th April, 1913; s Peppercorn (534), d Julietta (2094 F.S.).

### Class 104.—*Dexter Bull, calved in* 1912, 1913 *or* 1914. [7 entries.]

**I.** (**£10.**)—Rev. R. L. Simkin, Down Ampney Vicarage, Cricklade, black, **Oakridge Granddady,** born 24th May, 1912, bred by Mrs. Foster, Brockhampton Court, near Hereford; s Brockhampton Black Prince (407), d Brockhampton Jewel (1506), s d Don Quixote (466).

**II.** (**£5.**)—B. de Bertodano, Cowbridge House, Malmesbury, Wilts, red, **Cowbridge Dainty Boy** (Vol. xiv., p. 61), born 1st May, 1913; s Cowbridge Hero (H.B. 465), d Cowbridge Dainty Maid (H.B. 1643), s d Cowbridge Xit (H.B. 291).

**III.** (**£2.**)—His Majesty the King, Sandringham, black, **Robin Adair,** born 1914.

**R.**—H. M. Gibbs, Barrow Court, Flax Bourton, black, **Barrow Beau 2nd,** born 9th February, 1914: s Barrow Bacchus (419), d Barrow Brenda (1727).

(The Prizes in Class 105 were offered by the English Kerry and Dexter Cattle Society.)

### Class 105.—*Dexter Bull, calved in* 1914, *whose sire and dam were entered in the English Kerry and Dexter or Royal Dublin Society's Herd Book.* [5 entries.]

**I.** (**£10.**)—H. M. Gibbs, Barrow Court, Flax Bourton, black, **Barrow Beau,** born 9th February, 1914.

**II.** (**£3.**)—Rev. T. W. Hudson, Great Shefford Rectory, Lambourne, Berks, black, **Orpheus,** born 3rd June, bred by the Hon. J. Ward, Chilton, Hungerford, Berks; s Barrow Orphan (498 F.S.), d La Mancha Molly Maguire (1958), s d Castlelough Billy (550).

**III.** (£2.)—E. P. PEYTON, Woodcote Lodge, near Kenilworth, black, **Pierrot,** born 5th June ; s Paderewski (531), d Pierrette (2143), s d Paganini (532).

**R.**—MRS. LEATHAM, The Manor, Bagendon, Cirencester, black, **Blue Gum,** born 2nd June ; s Peppercorn, d Blue Bell, s d Good Luck.

## *SPECIAL PRIZE.*

### OFFERED BY THE ENGLISH KERRY AND DEXTER CATTLE SOCIETY.

*The Devonshire Challenge Cup, for the best Animal in Classes* 102 *to* 105, *bred by Exhibitor, and entered in or eligible for the English Kerry and Dexter Herd Book. The Cup to be won by the same Exhibitor with different animals three years in succession before becoming his absolute property.*

*The Certificate of Award of the English Kerry and Dexter Cattle Society is given to the owner of the winning animal on each occasion the Cup is competed for.*

**I.**—H. M. GIBBS, Barrow Court, Flax Bourton, black, **Barrow Buttercup 2nd.**

**R.**—B. DE BERTODANO, Cowbridge House, Malmesbury, Wilts, red, **Cowbridge Dainty Boy** (Vol. iv., p. 61).

## DAIRY.

(The Prizes in Class 106 were offered by the Herefordshire and Worcestershire Agricultural Society, and were open only to members of that Society resident in Herefordshire or Worcestershire.)

### CLASS 106.—*Dairy Cow of any Breed, in-Milk or in-Calf.* [3 entries.]

**I.** (£7.)—J. PRATT, Lickhill and Wood Green, Stourport, red and little white, Shorthorn, **Lickhill Baroness,** born 11th April, 1908; s Waddesdon Mighty Atom (90433), d Leawood's Baroness, s d Leawood's Klondyke.

**II.** (£4.)—J. PRATT, red, **Lickhill Countess 3rd,** born 30th April, 1910, s Conqueror (98441), d Countess of Clive 3rd, s d Alston Lark (85155).

**III.** (£2.)—G. GERRARD, Offerton Farm, Hindlip, Worcester, roan Shorthorn, **Henhull Daisy,** 6 years old, bred by T. C. Goodwin, Henhull Hall, Nantwich.

### CLASS 107.—*Dairy Cow, in-Milk, of any breed or cross, under* 950 *lbs. live weight, yielding the largest quantity of milk, of normal character, containing at each time of milking* 12 *per cent. of total solids, of which not less than* 3 *per cent. shall be fat, the period of lactation being taken into consideration.* [2 entries.]

**II.** (£5.)—LADY WERNHER, Luton Hoo, Luton, whole, **Carlsbad,** born 4th December, 1907 ; s King Henry (8571), d Cutnow, s d Bismarck's Boy (6786). (Last calf March 28, 1915.)

### CLASS 108.—*Dairy Cow, in-Milk, of any breed or cross, 950lbs. live weight or over, yielding the largest quantity of milk, of normal character, containing at each time of milking 12 per cent. of total solids, of which not less than 3 per cent. shall be fat, the period of lactation being taken into consideration.* [12 entries.]

**I.** (**£10.**)—PAGE AND WHITLEY, Warren Farm, Broughton, near Chester, **Milkmaid** (6543), born 10th July, 1905, bred by W. S. Harris, Well Farm, Stoke Gabriel, South Devon; s Hero 2nd (1650), d Pretty 2nd (4127), s d Widland Revelstoke (945).

**II.** (**£5.**)—PAGE AND WHITLEY, **Pathada Fancy 10th** (9561), born 9th May, 1909, bred by the late J. S. Tucker, Pathada, Menhenoit, Liskeard, Cornwall; s Golden King (2896), d Fancy 3rd (7421), s d Rags and Tatters (1724).

**III.** (**£2.**)—J. EVENS, Burton, red Lincoln Red Shorthorn, **Burton Fox 5th,** born 9th November, 1909; s Mr. Profit (4926), d Burton Fox 3rd, s d Burton Rex (2131). (Last calf 14th March, 1915).

**R.**—MRS. R. C. BAINBRIDGE, Elfordleigh, Plympton, South Devon, fawn, Guernsey, **Cherry,** born 1904, bred by J. Laity, Marazion, Cornwall; s Rosy Boy.

**V.H.C.**—G. GERRARD, Offerton Farm, Hindlip, Worcester, roan, Shorthorn, **Henhull Daisy,** 6 years old, bred by T. C. Goodwin, Henhull Hall, Nantwich.

**H.C.**—J. EVENS, red Lincoln Red Shorthorn, **Burton Royal Maid 4th,** born 19th May, 1908; s Persian Ruby (5570).

## SHEEP.

### SHROPSHIRE.

(The Prizes in Class 109 were offered by the Shropshire Sheep Breeders' Association and Flock Book Society.)

### CLASS 109.—*Shropshire Two Shear Ram.* [6 entries.]

**I.** (**£10.**)—A. S. BERRY, Shenstone Hall, Lichfield.

**II.** (**£3.**)—A. S. BERRY.

**III.** (**£2.**)—K. W. MILNES, Stanway Manor, Church Stretton.

**R.**—F. BIBBY, Hardwicke Grange, Shrewsbury.

### CLASS 110.—*Shropshire Shearling Ram.* [16 entries.]

**I.** (**£10.**)—F. BIBBY, Hardwicke Grange, Shrewsbury.

**II.** (**£5.**)—K. W. MILNES, Stanway Manor, Church Stretton.

**III.** (**£2.**)—E. C. TANNER, Shrawardine, Shrewsbury.

**R.**—E. C. Tanner.

**H.C.**—A. S. Berry, Shenstone Hall, Lichfield.—C. W. Kellock, Highfields, Audlem, Cheshire.

**C.**—R. E. Birch, Bryncelyn, St. Asaph.—K. W. Milnes.

### Class 111.—*Pair of Shropshire Ram Lambs, dropped in* 1915. [8 entries.]

**I. (£10.)**—R. E. Birch, Bryncelyn, St. Asaph.

**II. (£5.)**—E. C. Tanner, Shrawardine, Shrewsbury.

**III. (£2.)**—K. W. Milnes, Stanway Manor, Church Stretton.

**R.**—K. W. Milnes.

### Class 112.—*Pen of three Shropshire Shearling Ewes.* [8 entries.]

**I. (£10.)**—E. C. Tanner, Shrawardine, Shrewsbury.

**II. (£5.)**—A. S. Berry, Shenstone Hall, Lichfield.

**III. (£2.)**—K. W. Milnes, Stanway Manor, Church Stretton.

**R.**—C. W. Kellock, Highfields, Audlem, Cheshire.

**H.C.**—F. Bibby, Hardwicke Grange, Shrewsbury.—R. E. Birch, Bryncelyn, St. Asaph.—J. J. Brewin, Barnston, near Birkenhead.

(The Prizes in Classes 113 and 114 were offered by the Herefordshire and Worcestershire Agricultural Society, and were open only to members of that Society resident in Herefordshire or Worcestershire.)

### Class 113.—*Shropshire Shearling Ram.* [1 entry.]

**I. (£7.)**—W. Allsop, Home Farm, Bartestree, Hereford, bred by A. Bickley, Sutton-on-Hill, Shrewsbury.

### Class 114.—*Pen of three Shropshire Shearling Ewes—First prize, £7 —second, £3.*

[No Entry.]

## DEVON LONGWOOLLED.

### Class 115.—*Devon Longwoolled Shearling Ram.* [3 entries.]

**I. (£10.)**—F. White, Torweston, Williton.

**II. (£5.)**—F. White.

**III. (£2.)**—F. White.

### Class 116.—*Pen of three Devon Longwoolled Shearling Ewes.* [2 entries.]

**I. (£10.)**—F. White, Torweston, Williton.

**II. (£5.)**—F. White.

## SOUTH DEVON.

### Class 117.—*South Devon Shearling Ram.* [4 entries.]

**I.** (**£10.**)—W. and H. Whitley, Primley Farm, Paignton.
**II.** (**£5.**)—W. and H. Whitley.
**III.** (**£2.**)—J. Stooke, Sherford, Brixton, Plymouth.
**R.**—J. Stooke.

### Class 118.—*Pen of three South Devon Shearling Ewes.* [2 entries.]

**I.** (**£10.**)—W. and H. Whitley, Primley Farm, Paignton.
**II.** (**£5.**)—J. Stooke, Sherford, Brixton, Plymouth.

## KENT OR ROMNEY MARSH.

(The Prizes in Class 119 were offered by the Kent or Romney Marsh Sheep Breeders' Association.)

### Class 119.—*Kent or Romney Marsh Two Shear Ram.* [8 entries.]

**I.** (**£10.**)—J. E. Quested, The Firs, Cheriton, Kent.
**II.** (**£5.**)—J. E. Quested.
**III.** (**£2.**)—J. E. Quested.
**R.**—F. Neame, Macknade, Faversham.

### Class 120.—*Kent or Romney Marsh Shearling Ram.* [9 entries.]

**I.** (**£10.**)—J. E. Quested, The Firs, Cheriton, Kent.
**II.** (**£5.**)—F. Neame, Macknade, Faversham.
**III.** (**£2.**)—F. Neame.
**H.C.**—J. E. Quested.
**C.**—J. E. Quested.

### Class 121.—*Pair of Kent or Romney Marsh Ram Lambs dropped in* 1915. [6 entries.]

**I.** (**£10.**)—L. H. and W. G. Finn, Westwood Court, Faversham.
**II.** (**£5.**)—J. E. Quested, The Firs, Cheriton, Kent.
**III.** (**£2.**)—L. H. and G. W. Finn.
**R.**—J. E. Quested.

### Class 122.—*Pen of three Kent or Romney Marsh Shearling Ewes.* [4 entries.]

**I.** (**£10.**)—F. Neame, Macknade, Faversham.
**II.** (**£5.**)—F. Neame.
**III.** (**£2.**)—J. E. Quested, The Firs, Cheriton, Kent.
**R.**—J. E. Quested.

## SOUTHDOWN.

(The Prizes in Class 123 were offered by the Southdown Sheep Society.)

### CLASS 123.—*Southdown Two Shear Ram.* [11 entries.]

**I. £10.)**—J. R. WEST, Alscot Park, Stratford-on-Avon.

**II. (£5.)**—LADY WERNHER, Luton Hoo, Luton.

**III. (£2.)**—CAPTAIN D. MCCALMONT, Crockfords, Newmarket.

**R. & H.C.**—W. M. CAZALET, Fairlawne, Tonbridge.

**H.C.**—SIR J. COLMAN, BART., Gatton Park, Surrey.—DUKE OF RICHMOND AND GORDON, K.G., Goodwood Farm, Chichester.

**C.**—C. R. W. ADEANE, Babraham, Cambridge.—W. M. CAZALET.

### CLASS 124.—*Southdown Shearling Ram.* [21 entries.]

**I. (£10.)**—O. C. MILLEN, Adisham Court, Canterbury.

**II. (£5.)**—J. R. WEST, Alscot Park, Stratford-on-Avon.

**III. (£2.)**—HIS MAJESTY THE KING, Sandringham.

**R. & H.C.**—CAPTAIN A. C. HALL, The Manor, Great Rollright, Chipping Norton, Oxon.

**H.C.**—R. S. HICKS, Wilbraham, Temple, Cambs.—SIR J. COLMAN, BART., Gatton Park, Surrey.—SIR J. COLMAN, BART.

**C.**—C. R. W. ADEANE, Babraham, Cambridge.—W. M. CAZALET, Fairlawne, Tonbridge.

### CLASS 125.—*Pair of Southdown Ram Lambs, dropped in* 1915. [10 entries.]

**I. (£10.)**—HIS MAJESTY THE KING, Sandringham.

**II. (£5.)**—SIR J. COLMAN, BART., Gatton Park, Surrey.

**III. (£2.)**—W. M. CAZALET, Fairlawne, Tonbridge.

**R. & H.C.**—CAPTAIN A. C. HALL, The Manor, Great Rollright, Chipping Norton, Oxon.

**V.H.C.**—LADY WERNHER, Luton Hoo, Luton.

**H.C.**—CAPTAIN D. MCCALMONT, Crockfords, Newmarket.

**C.**—R. S. HICKS, Wilbraham, Temple, Cambs.—DUKE OF RICHMOND AND GORDON, K.G., Goodwood, Chichester.

## *SPECIAL PRIZE.*

### OFFERED BY THE SOUTHDOWN SHEEP SOCIETY, UNDER CONDITION 69.

### *Silver Medal, or* £1, *for the best Ram or Ram Lamb in Classes* 123, 124 *and* 125.

**I.**—**J. R. WEST, Alscot Park, Stratford-on-Avon.**

**R.**—**LADY WERNHER, Luton Hoo, Luton.**

### Class 126.—*Pen of three Southdown Shearling Ewes.* [7 entries.]

**I. (£10.)**—W. M. Cazalet, Fairlawne, Tonbridge.

**II. (£5.)**—Sir J. Colman, Bart., Gatton Park, Surrey.

**III. (£2.)**—His Majesty the King, Sandringham.

**R.**—Sir J. Colman, Bart.

**V.H.C.**—Lady Wernher, Luton Hoo, Luton.

**C.**—R. S. Hicks, Wilbraham, Temple, Cambs.

## HAMPSHIRE DOWN.

### Class 127.—*Hampshire Down Shearling Ram.* [5 entries.]

**I. (£10.)**—J. H. Ismay, Iwerne Minster House, Blandford, Dorset.

**II. (£5.)**—Captain J. A Morrison, Basildon Park, Reading.

**III (£2.)**—J. H. Ismay.

**V.H.C.**—Captain J. A. Morrison.

### Class 128.—*Pair of Hampshire Down Ram Lambs, dropped in* 1915. [5 entries.]

**I. (£10.)**—Mrs. Jervoise, Herr ard Park, Basingtsoke.

**II. (£5.)**—Captain J. A. Morrison, Basildon Park, Reading.

**III. (£2 )**—J. H. Ismay, Iwerne Minster House, Blandford, Dorset.

**C.**—A. W. B. Hawkins, Stagenhoe Park, Welwyn, Herts.

### Class 129.—*Pen of three Hampshire Down Shearling Ewes.—First prize,* £10—*second,* £5—*third,* £2.

[No Entry.]

(The Prizes in Class 130 were offered by the Hampshire Down Sheep Breeders' Association.)

### Class 130.—*Pen of three Hampshire Down Ewe Lambs, dropped in* 1915. [4 entries.]

**I (£7.)**—J. H. Ismay, Iwerne Minster House, Blandford, Dorset.

**II. (£3.)**—Captain J. A. Morrison, Basildon Park, Reading.

**C.**—Mrs. Jervoise, Herriard Park, Basingstoke.

## OXFORD DOWN.

### Class 131.—*Oxford Down Shearling Ram.* [7 entries.]

**I. (£10.)**—H. W. Stilgoe, The Grounds, Adderbury, near Banbury, Oxon.

**II. (£5.)**—H. W. Stilgoe.

**III. (£2.)**—A. Brassey, Heythrop Park, Chipping Norton.

**R. & H.C.**—A. Brassey.

**H.C.**—Miss A. de Rothschild, Waddesdon Manor, Aylesbury.—Miss A. de Rothschild.—H. W Stilgoe.

### CLASS 132.—*Pair of Oxford Down Ram Lambs, dropped in* 1915. [3 entries.]

**I. (£10.)**—H. W. STILGOE, The Grounds, Adderbury, near Banbury, Oxon.

**II. (£5.)**—A. BRASSEY, Heythrop Park, Chipping Norton.

**III. (£2.)**—H. W. STILGOE.

### CLASS 133.—*Pen of three Oxford Down Shearling Ewes.* [2 entries.]

**I. (£10.)**—A. BRASSEY, Heythrop Park, Chipping Norton.

**II. (£5.)**—MISS A. DE ROTHSCHILD, Waddesdon Manor, Aylesbury

(The Prizes in Class 134 were offered by the Oxford Down Sheep Breeders' Association, and were withheld until the Animals awarded the Prizes were registered in the Flock Book.)

### CLASS 134.—*Pair of Oxford Down Ewe Lambs, dropped in* 1915. [2 entries.]

**I. (£6.)**—H. W. STILGOE, The Grounds, Adderbury, near Banbury, Oxon.

**II. (£3.)**—A. BRASSEY, Heythrop Park, Chipping Norton.

## DORSET HORN.

### CLASS 135.—*Dorset Horn Shearling Ram.* [1 entry.]

**I. (£10.)**—F. J. MERSON & SON, Farringdon, North Petherton, Bridgwater, Somerset.

### CLASS 136.—*Pair of Dorset Horn Ram Lambs, dropped after November* 1, 1914. [3 entries.]

**I. (£10.)**—F. J. MERSON & SON, Farringdon, North Petherton, Bridgwater, Somerset.

### CLASS 137.—*Pen of three Dorset Horn Shearling Ewes.* [3 entries.]

**I. (£10.)**—GENERAL SEELY, D.S.O., M.P., Brooke Farm, Brooke, Isle of Wight.

**II. (£5.)**—F. J. MERSON AND SON, Farringdon, North Petherton, Bridgwater, Somerset.

(The Prizes in Class 138 were offered by the Dorset Horn Sheep Breeders' Association.)

### CLASS 138.—*Pen of three Dorset Horn Ewe Lambs, dropped after November* 1, 1914. [2 entries.]

**I. (£10.)**—F. J MERSON & SON, Farringdon, North Petherton, Bridgwater, Somerset.

## DORSET DOWN.

(The Prizes in Class 139 were offered by the Dorset Down Sheep Breeders' Association.)

### CLASS 139.—*Dorset Down Shearling Ram.* [3 entries.]

**I. (£10.)**—R. TORY, Charisworth Manor, Blandford, bred by T. Hooper, Wenfrith, Dorchester.

**II. (£3.)**—SIR E. HAMBRO, K.C.V.O., Milton Abbey, Blandford, Dorset, bred by R. Tory, Charisworth Manor, Whitechurch, Blandford.

**III. (£2.)**—SIR E. HAMBRO, K.C.V.O.

### CLASS 140.—*Pair of Dorset Down Ram Lambs, dropped in* 1915. [2 entries.]

**I. (£10.)**—R. TORY, Charisworth Manor, Blandford.

**II. (£5.)**—R. TORY.

### CLASS 141.—*Pen of three Dorset Down Shearling Ewes.* [6 entries.]

**I. (£10.)**—R. TORY, Charisworth Manor, Blandford.

**II. (£5.)**—R. TORY.

**III. (£2.)**—SIR E. HAMBRO, K.C.V.O., Milton Abbey, Blandford, Dorset.

**R.**—SIR E. HAMBRO, K.C.V.O.

## RYELAND.

(The Prizes in Class 142 were offered by the Herefordshire and Worcestershire Society, and were open only to members of that Society.)

### CLASS 142.—*Ryeland Ram, 2 shear and upwards.* [6 entries.]

**I. (£7.)**—MRS. HERBERT OF CLYTHA, Clytha Park, Abergavenny, bred by H. A. Christy, Llangoed, Breconshire.

**II. (£3.)**—THE EXECUTORS OF THE LATE F. E. GOUGH, Bodenham S.O., Herefordshire.

**R.**—D. J. THOMAS, Talachddu, Brecon.

**H.C.**—H. A. CHRISTY, Llangoed Castle, Breconshire.

(£15 towards the Prizes in Classes 143 to 146 were contributed by the Ryeland Flock Book Society.)

### CLASS 143.—*Ryeland Shearling Ram.* [8 entries.]

**I. (£10.)**—THE EXECUTORS OF THE LATE F. E. GOUGH, Bodenham S.O., Herefordshire.

**II. (£5.)**—D. J. THOMAS, Talachddu, Brecon.

**III.** (**£2.**)—THE EXECUTORS OF THE LATE F. E. GOUGH.

**R.**—H. A. CHRISTY, Llangoed Castle, Breconshire.

**H.C.**—H. A. CHRISTY.

### CLASS 144.—*Pair of Ryeland Ram Lambs, dropped in* 1915. [4 entries.]

**I.** (**£5.**)—THE EXECUTORS OF THE LATE F. E. GOUGH, Bodenham S.O., Herefordshire.

**II.** (**£2.**)—MRS. HERBERT OF CLYTHA, Clytha Park, Abergavenny.

**III.** (**£1.**)—E. JONES, Penybont, Sennybridge.

**R.**—H. A. CHRISTY, Llangoed Castle, Breconshire.

### CLASS 145.—*Pen of three Ryeland Shearling Ewes.* [4 entries.]

**I.** (**£10.**)—THE EXECUTORS OF THE LATE F. E. GOUGH, Bodenham S.O., Herefordshire.

**II.** (**£5.**)—H. A. CHRISTY, Llangoed Castle, Breconshire.

**III.** (**£2.**)—H. A. CHRISTY.

**R.**—MRS. M. E. GWYNNE HOLFORD, Buckland, Bwlch, Breconshire.

### CLASS 146.—*Pair of Ryeland Ewe Lambs, dropped in* 1915. [4 entries.]

**I.** (**£5.**)—MRS. HERBERT OF CLYTHA, Clytha Park Abergavenny

**II.** (**£2.**)—THE EXECUTORS OF THE LATE F. E. GOUGH, Bodenham S.O., Herefordshire.

**III.** (**£1.**)—E. JONES, Penybout, Sennybridge.

**R.**—H. A. CHRISTY, Llangoed Castle, Breconshire.

## KERRY HILL.

(Of the Prizes offered in Classes 147 to 150, £10 were contributed by the Herefordshire and Worcestershire Agricultural Society, and £20 by the Kerry Hill (Wales) Flock Book Society.)

### CLASS 147.—*Kerry Hill Ram,* 2 *shear and upwards.* [2 entries.]

**I.** (**£5.**)—THE EARL OF POWIS, Powis Castle, Welshpool, bred by J. Morris, Gwernygoe Sarn, Newtown.

### CLASS 148.—*Kerry Hill Shearling Ram.* [4 entries.]

**I.** (**£5.**)—THE EARL OF POWIS, Powis Castle, Welshpool.

**II.** (**£3.**)—COLONEL T. WOOD, Gwernyfed, Three Cocks, Breconshire.

**III.** (**£2.**)—THE LORD HARLECH, Brogyntyn Home Farm, Oswestry.

**R.**—CAPTAIN J. M. NAYLOR, Leighton Hall, Welshpool.

### CLASS 149.—*Pen of three Kerry Hill Ewes that had reared Lambs in* 1915. [2 entries.]

[NO EXHIBIT.]

### CLASS 150.—*Pen of three Kerry Hill Shearling Ewes.* [5 entries.]

**I.** (**£5.**)—CAPTAIN J M. NAYLOR, Leighton Hall, Welshpool.

**II.** (**£3.**)—THE LORD HARLECH, Brogyntyn Home Farm, Oswestry.

**III.** (**£2.**)—COLONEL T. WOOD, Gwernyfed, Three Cocks, Breconshire.

**R.**—THE EARL OF POWIS, Powis Castle, Welshpool.

## PIGS.

### BERKSHIRE.

### CLASS 151.—*Berkshire Boar, farrowed in* 1912, 1913 *or* 1914. [7 entries.]

**I.** (**£7.**)—G. S. F. EDWARDS, Nunthorpe Hall, Yorks, **Little John** (18057), born 5th June, 1913, bred by R. B. Vincent, Waterston, Dorsetshire; s Herrison Lad (16937), d Compton Grace (16727), s d Manor First Venture (16352).

**II.** (**£3.**)—W. BUCKLEY, Moundsmere Manor, Basingstoke, **Moundsmere Warrior** (17564), born 22nd June, 1913 s Moundsmere Curious (16522), d Moundsmere Kernel (16529), s d Axford Viscount (15008).

**III.** (**£2.**)—J H ISMAY, Iwerne Minster House, Blandford, Dorset, **Iwerne Lord** (18493), born 25th June, 1913; s Coronation Topper (16827), d Iwerne 4th (15503).

**R.**—HON. C. B. PORTMAN, Goldicote, Stratford-on-Avon, **Goldicote Hun** (18404), born 9th August, 1913; s Enham Manx (15301), d Goldicote Hairpin (16550), s d Great Scot 2nd (15238).

### CLASS 152.—*Pair of Berkshire Boars, farrowed in* 1915. [3 entries.]

**I.** (**£5.**)—THE DUKE OF WESTMINSTER, Eaton, Chester, born 2nd January; s Minley Warrior (15982), d Eaton Ju-ju 2nd (17847), s d Puddington Heirloom (15909).

**II.** (**£2.**)—W. BUCKLEY, Moundsmere Manor, Basingstoke, born 12th January; s Lavaine (18020), d Moundsmere Daisy (16651) s d Goldicote John (15003).

**III.** (**£1.**)—HON. C B. PORTMAN, Goldicote, Stratford-on-Avon, born 5th January; s Rob Roy (17619), d Goldicote Hebe (18406), s d Enham Manx (15301).

## CLASS 153.—*Berkshire Breeding Sow, farrowed before* 1915.

[7 entries.]

**I.** (**£7.**)—J. H. ISMAY, Iwerne Minster House, Blandford, Dorset, **Charmer 2nd** (18508), born 2nd January, 1914, bred by J. Fricker, Suddon Grange, Wincanton ; s Robert (14695), d Suddon Freda (16109).

**II.** (**£3.**)—HON. C. B. PORTMAN, Goldicote, Stratford-on-Avon, **Goldicote Viceroine** (17608), born 30th December, 1912, bred by E. Portman, Goldicote, Stratford-on-Avon ; s Enham Manx (15301), d Vine (16539), s d One A (15005).

**III.** (**£2.**)—W. BUCKLEY, Moundsmere Manor Basingstoke, **Moundsmere Primrose 8th** (16519), born 3rd September, 1911 ; s Moundsmere Mikado (15224), d Danesfield Primrose (13853), s d Danesfield Millar (19002).

**R. & H.C.**—J. H. ISMAY, **Manor Miss Nunster** (17708), born 4th January, 1913, bred by A. Hiscock, Motcombe Manor Farm, Shaftesbury ; s Compton Viscount (15516), d Favourite Lady (16876).

**H.C.**—THE DUKE OF WESTMINSTER, Eaton, Chester, **Belinda 6th** (17857), born 8th June, 1913, bred by J. Fricker ; s Robert (14635), d Suddon Kate (15433), s d Fightable (11246).

**C.**—G. S. F. EDWARDS, Nunthorpe Hall, Yorks, **Fashion Augustus 3rd** (17907), born 3rd September, 1913, bred by W. A. Barnes, Shirley, Birmingham; s Santoi B (16447), d Fashion Augustus (16901), s d Jasper Augustus (13246).
—W. H. PALMER, Stokes' Farm, Wokingham, **Murrell Maid** (18476), born 10th January, 1914 ; s Minley Champion (17122), d Murrell Sylvia (17343), s d Marlboro 3rd (14582).

## CLASS 154.—*Pair of Berkshire Breeding Sows, farrowed in* 1915.

[5 entries.]

**I.** (**£5.**)—W. BUCKLEY, Moundsmere Manor, Basingstoke, born 2nd January ; s Express 13 (17189), d Moundsmere Thorn (16524), s d Goldicote John (15003).

**II.** (**£2.**)—G. S. F. EDWARDS, Nunthorpe Hall, Yorks, born 29th January ; s Whitley's King's Minister (17971), d Fashion Augustus 3rd (17907), s d Santoi B (16447).

**III.** (**£1.**)—THE DUKE OF WESTMINSTER, Eaton, Chester, born 2nd January ; s Minley Warrior (15982), d Eaton Ju-ju 2nd (17847), s d Puddington Heirloom (15909).

**R. & H.C.**—W. H. PALMER, Stokes' Farm, Wokingham, Berks, born 2nd January ; s Minley Champion (17122), d Lady Belka (18477), s d Axford Viscount (15008).

## *SPECIAL PRIZE.*

### OFFERED BY THE BRITISH BERKSHIRE SOCIETY.

***Best Boar or Sow in the Berkshire Classes entered in, or eligible for, the Herd Book, whose Sire and Dam, together with the name of its Breeder, were entered in the Catalogue.***

**I.** (**£5.**)—G. S. F. EDWARDS, Nunthorpe Hall, Yorks, **Little John** (18057).

**R.**—J. H. ISMAY, Iwerne Minster House, Blandford, Dorset, **Charmer 2nd** (18508).

## LARGE BLACK.

### Class 155.—*Large Black Boar, farrowed in* 1912, 1913, *or* 1914.
[5 entries.]

**I. (£7.)**—T. F. Hooley Dry Drayton, near Cambridge, **Drayton Peter** (4017), born 16th April. 1912; s Henley Achilles (1999), d Drayton Violet (9010), s d Drayton Demon 4th (2353).

**II. (£3.)**—J. Warne, Treveglos, St. Mabyn, S.O., Cornwall, **Treveglos Gunner,** born 10th January, 1914; s Valley Hero (1027), d Treveglos Lass 6th (10526), s d Sudbourne Jock (3005).

**III. (£2.)**—W. J. Warren, Farthing's Farm, Comeytrowe, Taunton, **Kibbear Pride 1st,** born 1st May, 1914: s Cornwood Magistrate (4271), d Kibbear Long Lady (11558), s d Cornwood George 1st (3519).

**R.**—H. J. Kingwell, Bow Grange, Totnes, Devon, **Brent Handy Man,** born 18th February, 1914; s Cornwood Good Gift (4617), d Brent Sunflower 24th (12028), s d Jansor King Tom (2951).

### Class 156.—*Pair of Large Black Boars, farrowed in* 1915.
[6 entries.]

**I. (£5.)**—T. F. Hooley, Dry Drayton, near Cambridge, born 10th January; s Cornwood Don John (4169), d Papworth Lavender (13312), s d Drayton Valesman (2973).

**II. (£2.)**—S. F. Edge, Gallop's Homestead, Ditchling, Sussex, born 7th January; s Hasketon Lux 19th (3745), d Sudbourne Thora (12416), s d Lynchmere Squire (3805).

**III. (£1.)**—W. and H. Whitley, Primley Farm, Paignton, born 6th January; s Brent King Tom (3875), d Primley Eva (13330), s d Tiptree 1st (2933).

**R.**—H. J. Kingwell, Bow Grange, Totnes, Devon, born 1st January; s Cornwood Good Gift (4617), d Brent Sunflower 23rd (12026), s d Tansor King Tom (2951).

**H.C.**—J. Warne, Treveglos, St. Mabyn, S.O., born 6th January; s Treveglos Bob 2nd (4595), d Cleave Countess 6th (13534) s d Cleave Hero (3959).

**C.**—Miss Kay-Mouat, Morton Farm, Castlemorton, Worcestershire, born 11th January; s Sudbourne Champion Lad, d Ratby Fanny, s d Ratby John Bull.

### Class 157.—*Large Black Breeding Sow, farrowed before* 1915.
[8 entries.]

**I. (£7.)**—S. F. Edge, Gallops Homestead, Ditchling, Sussex, **Vadan Princess Arabella** (12374), born 22nd July, 1913; s Flock Swell, d Flower of the Valley (11672), s d Bosoha Masterpiece (3395).

**II. (£3.)**—T. F. Hooley, Dry Drayton, near Cambridge, **Drayton Debit** (14476), born 4th May, 1914,; s Bassingbourne Achilles (4655), d Docking Damsel (11520), s d Drayton Major (3627).

III (£2.)—W. AND H. WHITLEY, Primley Farm, Paignton, **Primley Godiva** (14180), born 22nd January, 1914; s Tiptree 1st (2933), d Primley Chloe (10168), s d Primley Marquis (2451).

R.—T. F. HOOLEY, **Drayton Delta** (14474), born 10th January, 1914; s Docking Victor (4221), d Drayton Hope (9724) s d Henley Victor (2947).

H.C.—J. WARNE, Treveglos, St. Mabyn S.O., Cornwall, **Treveglos Queen,** born 12th May, 1914: s Valley Hero (3027), d Treveglos Lucky Maid (12934), s d Bixley None Such 2nd (3467).—W. AND H. WHITLEY, **Primley Gaiety** (14178), born 12th January, 1914: s Tiptree 1st (2933), d Brent Susie 4th (7562), s d Whalesborough Chief (717).

C.—MISS KAY-MOUAT, Morton Farm, Castlemorton, Worcestershire, **Ratby Fanny,** born 20th May, 1913, bred by H. T. Freeman, Old Hayes Farm, Ratby; s Ratby John Bull, d Drayton Fanny, s d Henley Victor.

(The Prizes in Class 158 were offered by the Large Black Pig Society.)

## CLASS 158.—*Large Black Breeding Sow, not exceeding* 12 *months old on May* 1, 1915. [6 entries.]

I. (£7.)—T. F. HOOLEY, Dry Drayton, near Cambridge, **Drayton Debit** (14476), born 4th May, 1914; s Bassingbourne Achilles (4655), d Docking Damsel (11520), s d Drayton Major (3627).

II. (£3.)—J. C. OLVER, Woodland Valley, Ladock, Cornwall, **Type of the Valley,** born 2nd May, 1914; s Valley Togo, d Beauty of the Valley 8th, s d Old Fashion.

III. (£2.)—J. WARNE, Treveglos St. Mabyn S.O., Cornwall, **Treveglos Queen,** born 12th May, 1914; s Valley Hero (3027), d Treveglos Lucky Maid (12934), s d Bixley None Such 2nd (3467).

C.—W. AND H. WHITLEY, Primley Farm, Paignton, **Primley Grace** (14182), born 30th July, 1914; s Bentley Budget 2nd (4435), d Hasketon Long Bess 26th (10694), s d Bridgeman 1st (2965).

## CLASS 159.—*Pair of Large Black Breeding Sows, farrowed in* 1915. [7 entries.]

I. (£5.)—T. F. HOOLEY, Dry Drayton, near Cambridge, born 10th January; s Cornwood Don John (4169), d Papworth Lavender (13312), s d Drayton Valesman (2973).

II. (£2.)—J. C. OLVER, Woodland Valley, Ladock, Cornwall, born 5th January; s Bixley None Such, d Beauty of the Valley 8th, s d Old Fashion.

III. (£1.)—W. AND H. WHITLEY, Primley Farm, Paignton, born 7th January; s Brent King Tom (3875), d Primley Dora (11564), s d Brent Happy Boy (2219).

R.—S. F. EDGE, Gallop's Homestead, Ditchling, Sussex, born 7th January; s Hasketon Lux 19th (3745), d Sudborne Thora 1st (12416), s d Lynchmere Squire (3805).

H.C.—W. J. WARREN, Farthing's Farm, Comeytrowe, Taunton, born 10th February; s Cornwood Magistrate (4271), d Kibbear Black Lady 2nd (10944), s d Cornwood George 1st (3519).

## LARGE WHITE.

### CLASS 160.—*Large White Boar, farrowed in* 1912, 1913 *or* 1914.
[3 entries.]

I. (£7.)—R. E. W. STEPHENSON, Tue Brook, Liverpool, **Stamford Roger 3rd** (16339), born 2nd January, 1912, bred by G. Pimlott, Queen's Buildings, Altrinham; s Worsley Roger 49th (12959), d Stamford Girl (33284), s d Worsley Turk 23rd (14333).

### CLASS 161.—*Pair of Large White Boars, farrowed in* 1915.
[1 entry.]

I. (£5.)—R. E. W. STEPHENSON, Tue Brook, Liverpool, born 1st January; s Bridegroom of Bourne (15991), d Worsley Empress 83rd (39600), s d Worsley Monarch 46th (15499).

### CLASS 162.—*Large White Breeding Sow, farrowed before* 1915.
[5 entries.]

I. (£7.)—R. E. W. STEPHENSON, Tue Brook, Liverpool, **Dogsthorpe Dido** (31802), born 5th March, 1911, bred by H. G. Wadlow, Peterborough; s Somerby Gladiator (14039), d Tallington Treasure (29926), s d Ruddington Right Stamp (8717).

### CLASS 163.—*Pair of Large White Breeding Sows, farrowed in* 1915.
[1 entry.]

I. (£5.)—R. E. W. STEPHENSON, Tue Brook, Liverpool, born 13th January; s Emperor of Mayfield (17335), d Mavourneen of West Derby (Vol. xxxi.), s d Worsley Jay 14th (16571).

## MIDDLE WHITE.

### CLASS 164.—*Middle White Boar, farrowed in* 1912, 1913 *or* 1914.
[2 entries.]

I. (£7.)—L. C. PAGET, Middlethorpe Hall, York, **Reveller of Wharfedale** (18115), born 6th January, 1913, bred by the Trustees of Earl of Latham, Latham House, Ormskirk; s Blythe Reveller (15575), d Miss Pattie (30850), s d Tarbock Clumber (12101).

II (£3.)—L. C. PAGET, **Sentinel of Wharfedale** (18123), born 12th January, 1912, bred by C. Spencer, Harthay Farms, Brampton; s Holywell Spider (15641), d Dinah of Wharfedale (34038), s d Holywell Vicar 3rd (12073).

### CLASS 165.—*Pair of Middle White Boars, farrowed in* 1915.
[4 entries.]

I. (£5.)—L. C. PAGET, Middlethorpe Hall, York, born 7th January, bred by the Earl of Sefton, Croxteth Hall, Liverpool; s Croxteth Banker 2nd (16733), d Tarbock Pattie 13th (22084), s d Walton Turret 12th (9453).

**II.** (**£2.**)—L. C. PAGET, born 5th January, bred by Earl of Sefton, Croxteth Hall, Liverpool; s Croxteth Acrobat (18033), d Croxteth Pattie 21st (36798), s d Banker of Castlecroft (12995).

**III.** (**£1.**)—L. C. PAGET, born 23rd January; s Wharfedale Patrick (Vol. xxxi.), d Pendley Grace 20th (36964), s d Walton of Pendley (15711).

### CLASS 166.—*Middle White Breeding Sow, farrowed before* 1915.
[3 entries.]

**I.** (**£7.**)—L. C. PAGET, Middlethorpe Hall, York, **Wharfedale Revella** (34332), born 2nd January, 1911; s Wharfedale Reveller (11329), d Wharfedale Marguerite (27194), s d Wharfedale Flash (13127).

**II.** (**£3.**)—G. W. STARK, Forge Farm, Caerleon, **Primrose**, born 20th January, 1909, bred by the Earl of Sefton, Croxteth Park, Liverpool; s Tarbock Clumber (12101), d Tarbock Pattie 12th (22082), s d Walton Truant 12th (9453).

### CLASS 167.—*Pair of Middle White Breeding Sows, farrowed in* 1915.
[4 entries.]

**I.** (**£5.**)—L. C. PAGET, Middlethorpe Hall, York, born 3rd January, bred by the Earl of Sefton, Croxteth Hall, Liverpool; s Croxteth Acrobat (18033), d Croxteth Pattie 32nd (39858), s d Carrington Vicar 3rd (15583).

**II.** (**£2.**)—L. C. PAGET, born 4th January, bred by the Earl of Sefton, Croxteth Hall, Liverpool; s Croxteth Banker 2nd (16733), d Croxteth Rose 42nd (39886), s d Carrington Vicar 3rd (15583).

## TAMWORTH.

### CLASS 168.—*Tamworth Boar, farrowed in* 1912, 1913 *or* 1914.
[1 entry.]

**I.** (**£7.**)—D. W. PHILIP, The Redlands, Whitacre, Birmingham, **Kerr's Choice** (19593), born 23rd August, 1913, bred by H. C. Stephens, Cholderton, Salisbury; s Peer's Choice (16953), d Cholderton Golden Jewel (24282), s d Rolleston Victor (8357).

### CLASS 169.—*Pair of Tamworth Boars, farrowed in* 1915.
[2 entries.]

**I.** (**£5.**)—D. W. PHILIP, The Redlands, Whitacre, Birmingham, born 5th January; s M.P. (19607), d Cholderton Tibbie (40218), s d Peer's Choice (16953).

**II.** (**£2.**)—MESSRS. J. L. AND A. RILEY, Putley, Ledbury, Herefordshire, born 24th January; s Bristol (18181), d Putley Nelly (40344), s d Croesus (12137).

### CLASS 170.—*Tamworth Breeding Sow, farrowed before* 1915. [2 entries.]

**I.** (£7.)—MESSRS. J. L. AND A. RILEY, Putley, Ledbury, Herefordshire, **Putley Cherry** (34634), born 8th February, 1911 ; s Knowle Monarch (13199), d Countess (24262), s d Monmouth 2nd (11421).

**II.** (£3.)—D. W. PHILIP, The Redlands, Whitacre, Birmingham, **Ida of Whitacre** (40238), born 3rd January, 1913, bred by R. Ibbotson, The Hawthorns, Knowle, Warwickshire ; s Knowle Professor (15793), d Kathleen (34556), s d Dick of Osmaston (13143).

### CLASS 171.—*Pair of Tamworth Breeding Sows, farrowed in* 1915. [2 entries.]

**I.** (£5.)—D. W. PHILIP, The Redlands, Whitacre, Birmingham, born 13th January ; s Kerr's Choice, d Whitacre Miss, s d Whitacre Jester.

**II.** (£2.)—MESSRS. J. L. AND A. RILEY, Putley, Ledbury, Herefordshire, born 24th January ; s Bristol (18181), d Putley Nelly, (40344), s d Croesus (12137).

## PRODUCE.

### CIDER.

(Open to Growers or Makers.)

(The Winners in these Classes could have Gold, Silver or Bronze Medals instead of Money Prizes if they preferred them.)

### CLASS 172.—*Cask of not less than* 18 *and not more than* 30 *gallons of Cider, made in* 1914, *of a specific gravity not exceeding* 1.015 *at* 60 *deg. Fahr.* [9 entries.]

**I.** (£3.)—QUANTOCK VALE CIDER CO.

**II.** (£2.)—PULLIN BROS.

**III.** (**Bronze Medal.**)—RIDLER & SON.

**V.H.C.**—H. J. DAVIS.

### CLASS 173.—12 *Bottles of Cider, made in* 1914, *of a specific gravity not exceeding* 1.015 *at* 60 *deg. Fahr.* [9 entries.]

**I.** (**Gold Medal.**)—RIDLER & SON.

**II.** (£2.)—QUANTOCK VALE CIDER CO.

**III.** (£1.)—W. T. S. TILLEY.

**V.H.C.**—H. J. DAVIS.

### CLASS 174.—*Cask of not less than* 18 *and not more than* 30 *gallons of Cider, made in* 1914. [12 entries.]

**I. (£3.)**—H. J. DAVIS.
**II. (Silver Medal.)**—RIDLER & SON.
**III. (£1.)**—H. J. DAVIS.
**V.H.C.**—YEOMANS BROS.

### CLASS 175.—12 *Bottles of Cider, made in* 1914. [16 entries.]

**I. (Gold Medal.)**—RIDLER & SON.
**II. (Silver Medal.)**—RIDLER & SON.
**III. (£1.)**—PULLIN BROS.
**V.H.C.**—H. J. DAVIS.
**H.C.**—YEOMANS BROS.

### CLASS 176.—12 *Bottles of Cider made in any year previous to* 1914. [10 entries.]

**I. (£3.)**—H. J. DAVIS.
**II. (£2.)**—W. T. S. TILLEY.
**III. (£1.)**—H. J. DAVIS.
**V.H.C.**—W. T. S. TILLEY.

## CHEESE.

### CLASS 177.—*Three Cheddar Cheeses (not less than 56lbs. each), made in* 1914. [13 entries.]

**I. (£10.)**—A. E. PADFIELD & SON.
**II. (£7.)**—J. W. BANWELL.
**III. (£4.)**—J. BURFITT.
**R. & V.H.C.**—C. C. HARDING.
**H.C.**—A. WARREN.
**C.**—E. E. HODDINOTT.—A. OSBORNE.—A. STONE & SON.

### CLASS 178.—*Three Cheddar Cheeses (not over 56lbs. each), made in* 1914. [6 entries.]

**I. (£8.)**—A. E. PADFIELD & SON.
**II. (£5.)**—E. E. HODDINOTT.
**III. (£3.)**—E. J. CARY.
**R.**—C. C. HARDING.

CLASS 179.—*Three Single Gloucester or Wilts Cheeses, made in* 1914—*First prize*, £6—*second*, £4—*third*, £2. [1 entry.]

[NO AWARD.]

CLASS 180.—*Eight Loaf or other Truckle Cheeses, made in* 1914. [6 entries.]

**I.** (**£5.**)—J. CANDY.
**II.** (**£3.**)—J. W. BANWELL.
**III.** (**£2.**)—A. STONE & SON.
**R.**—E. E. HODDINOTT.

CLASS 181.—*Three Caerphilly Cheeses, made in* 1915. [7 entries.]

**I.** (**£5.**)—WILTS UNITED DAIRIES.
**II.** (**£3.**)—E. DIBBLE.
**III.** (**£2.**)—E. J. DUCKETT.
**R.**—WILTS UNITED DAIRIES.

## CREAM CHEESE, BUTTER AND CREAM.

(These Classes were not open to Professional Teachers).

CLASS 182.—*Three Cream or other Soft Cheeses.* [6 entries.]

**I.** (**£3.**)—MRS. W. H. PALMER.
**II.** (**£2.**)—MRS. M. WOODHOUSE.
**III.** (**£1.**)—MISS L. YELD.
**R.**—PERKIN & SON.

CLASS 183.—*3lbs. of Fresh (or very slightly salted) Butter.* [30 entries.]

**I.** (**£4.**)—J. C. LLOYD.
**I.** (**£4.**)—MRS. L. R. MILDON.
**II.** (**£3.**)—MRS. GROVE.
**II.** (**£3.**)—MRS. R. UNDERWOOD.
**III.** (**£2.**)—MRS. M. BULLOCK.
**III.** (**£2.**)—MISS E. G. BURLTON.
**IV.** (**£1.**)—MRS. T. MILES.
**IV.** (**£1.**)—MRS. W. H. PALMER.
**R. & V.H.C.**—MRS. J. WAY.
**V.H.C.**—MRS. J. M. MARTIN.—MRS. S. TAYLOR.
**H.C.**—MISS DENNE.—MISS C. PERKINS.—MISS G. TUCKETT.

### CLASS 184.—*3lbs. of Fresh (or very slightly salted) Butter, made from scalded cream.* [10 entries.]

**I.** (**£4.**)—MRS. J. WAY.
**II.** (**£3.**)—MRS. L. R. MILDON.
**III.** (**£2.**)—MISS L. YELD.
**R.**—MRS. M. BULLOCK.
**V.H.C.**—MISS E. BEER.—MRS. GROVE.
**H.C.**—MISS G. TUCKETT.

### CLASS 185.—*3lbs. of Butter, in the making of which no salt had been used, judged on the last day of Show.* [15 entries.]

**I.** (**£4.**)—MRS. L. R. MILDON.
**II.** (**£3.**)—MRS. M. BULLOCK.
**III.** (**£2.**)—MRS. J. WAY.
**IV.** (**£1.**)—A. F. SOMERVILLE.
**R.**—MRS. R. UNDERWOOD.
**V.H.C.**—LORD PORTMAN.
**H.C.**—MRS. W. H. PALMER.
**C.**—MISS R. HARDING.—MISS C. PERKINS.

### CLASS 186.—*Not less than 6lbs. of Fresh Butter packed for transit.* [7 entries.]

**I.** (**£3.**)—MRS. L. R. MILDON.
**II.** (**£1 10s.**)—MRS. GROVE.
**III.** (**10s.**)—MRS. W. H. PALMER.
**R.**—MRS. A. MARTIN.

### CLASS 187.—*12lbs. of Keeping Butter, in a jar or crock, delivered to the Secretary four weeks before the Show.* [5 entries.]

**I.** (**£4.**)—MRS. L. R. MILDON.
**II.** (**£3.**)—MRS. W. H. PALMER.
**III.** (**£2.**)—LORD PORTMAN.
**R.**—MRS. O. T. JENKINS.

### CLASS 188.—*Four half-pounds of Scalded Cream.* [7 entries.]

**I.** (**£3.**)—MRS. W. R. BEER.
**II.** (**£2.**)—W. BEER.
**III.** (**£1.**)—C. AND G. PRIDEAUX.
**R.**—MISS E. BEER.

# COMPETITIONS.

## BUTTER-MAKING.

The Prizes in Classes 189, 193 and 194, were offered by the Worcestershire County Council, in Classes 199 and 200 by the Herefordshire County Council, and in Classes 201 and 202 by the Gloucestershire County Council.

(No Winner of a 1st Prize given by this Society for Butter-making during the last three years was eligible to compete in Class 190 or 191.)

CLASS 189.—*For Students who had attended the Worcester County Dairy School, and had not previously won a Prize at the Shows of the Bath and West and Southern Counties Society or the Herefordshire and Worcestershire Agricultural Society. On the first day of Show.* [20 entries.]

**I.** (**£2.**)—MISS M. HARTLEY.
**II.** (**£1 10s.**)—MISS JENNIE SMITH.
**III.** (**£1.**)—MISS I. M. GITTINS.
**IV.** (**10s.**)—MISS F. J. KEEN.
**R.**—MISS H. HOLL.
**V.H.C.**—MISS S. FLETCHER.
**H.C.**—MISS P. E. JACKSON.
**C.**—MISS D. VAN BYLEVETT.

CLASS 199.—*For Students who had received instruction under the Herefordshire County Council, and had never won a Prize for Butter-making at an Agricultural Show. On the first day of Show.* [11 entries.]

**I.** (**£2.**)—MISS D. VAUGHAN.
**II.** (**£1 10s.**)—MISS M. EDWARDS.
**III.** (**£1.**)—MISS N. E. LLOYD.
**IV.** (**10s.**)—MISS N. MORGAN.
**R.**—MISS A. S. LEIGHTON.
**V.H.C.**—MISS M. ADDIS.
**H.C.**—MISS E. G. BURLTON.
**C.**—MISS D. M. BROWN-CAVE.

CLASS 190.—*For first year students who had been through a course of instruction in Butter-making at any County Council School since the Society's last Show. On the second day of Show.* [30 entries.]

**I.** (**£4.**)—MISS C. PERKINS.

**II.** (**£3.**)—MISS E. LEWIS.

**III.** (**£1 10s.**)—MISS BATEMAN.

**IV.** (**£1.**)—MISS I. DOBBS.

**R.**—MISS E. M. RUDGE.

**V.H.C.**—MISS M. ADDIS.—MISS D. E. RICE.

**H.C.**—MISS H. HOLL.

**C.**—MISS D. VAN BYLEVETT.—MISS JENNIE SMITH.

CLASS 201.—*For Students of the Gloucestershire County Council Dairy School who had never won a County Prize. On the second day of Show.* [11 entries.]

**I.** (**£2.**)—MISS C. L. CULLIMORE.

**II.** (**£1 10s.**)—MISS M. WEEKES.

**III.** (**£1.**)—MISS D. M. ORGAN.

**IV.** (**10s.**)—MISS F. TAYLOR.

**R.**—MISS K. C. PANES.

**V.H.C.**—MISS M. HOLPIN.—MISS M. H. READ.

**H.C.**—MISS A. BARTLETT.

CLASS 191.—*For Men and Women, on the third day of Show.* [30 entries.]

**I.** (**£4.**)—MRS. W. WATTS.

**II.** (**£3.**)—MISS C. PANTALL.

**III.** (**£1 10s.**)—MISS B. T. WEEKES.

**IV.** (**£1.**)—MRS. E. WATTS.

**R.**—MRS. M. JONES.

**V.H.C.**—MISS M. BOMFORD.—MISS F. J. KEEN.—MISS C. SPENCER.—MISS M. C. THOMAS.

**H.C.**—MISS D. COWELL.—MISS E. LEWIS.

**C.**—MISS A. K. COBB.—MISS I. DOBBS.—MISS N. JONES.—MISS A. A. KINGTON.—MRS. T. MILLS.—MISS E. M. MORTIMER.—MISS M. NIXON.—MRS. L. SCOWN.—MISS JENNIE SMITH.—MISS M. STRATTON.

CLASS 200.—*For Students who had received instruction under the Herefordshire County Council. On the third day of Show.* [19 entries.]

**I.** (**£4.**)—MISS N. JONES.

**II.** (**£3.**)—MISS E. PARRY.

**III.** (**£2.**)—MRS. M. JONES.

**IV.** (**£1.**)—MISS E. ADDIS.

**R.**—MRS. S. TAYLOR.

**V.H.C.**—MISS C. PANTALL.

**H.C.**—MISS M. ADDIS.—MISS N. E. LLOYD.—MISS S. A. MORGAN.

**C.**—MISS H. ATTWOOLE.—MISS B. HEWING.—MISS E. HOLLOWAY.

CLASS 202.—*For Gloucestershire County Council Dairy School Students. On the third day of Show.* [16 entries.]

**I.** (**£4.**)—MISS B. T. WEEKES.

**II.** (**£3.**)—MISS A. RUGMAN.

**III.** (**£2.**)—MISS M. A. SILVEY.

**IV.** (**£1.**)—MISS M. MONNINGTON.

**R.**—MISS J. K. JONES.

**V.H.C.**—MISS C. M. READ.

**H.C.**—MISS M. H. READ.

CLASS 192.—*For Men and Women, on the fourth day of Show.* [30 entries.]

**I.** (**£4.**)—MISS N. JONES.

**II.** (**£3.**)—MISS J. JAMES.

**III.** (**£1 10s.**)—MISS M. C. THOMAS.

**V.H.C.**—MISS R. HULL.—MRS. M. JONES.—MISS E. PARRY.—MRS. F. J. K. FOWLER.—MRS. E. WATTS.—MISS K. WOOKEY.

**H.C.**—MISS M. BOMFORD.—MISS I. DOBBS.—MISS E. HOLLOWAY.—MISS M. NIXON.—MRS. W. H. WYNN.

**C.**—MISS E. ADDIS.—MISS M. FLETCHER.—MISS A. SPENCER.—MRS. S. TAYLOR.

CLASS 193.—*For Students who had attended the Worcestershire County Dairy School, and had not previously won a Prize at the Shows of the Bath and West and Southern Counties Society or the Herefordshire and Worcestershire Agricultural Society. On the fourth day of Show.* [17 entries.]

**I.** (**£2.**)—MISS JANE SMITH.

**II.** (**£1 10s.**)—MISS P. E. JACKSON.

**III. (£1.)**—Miss M. Hardy.

**IV. (10s.)**—Miss C. Reynolds.

**R.**—Miss A. M. Ford.

**V.H.C.**—Miss S. Fletcher.—Miss D. Moseley.

**H.C.**—Miss D. Van Bylevett.

Class 194.—*For winners of Prizes in Classes* 189 *or* 193, *or at any Competitions of the Herefordshire and Worcestershire Agricultural Society. On the fifth day of Show.* [18 entries.]

**I. (£2.)**—Miss M. Stratton.

**II. (£1 10s.)**—Miss A. A. Kington.

**III. (£1.)**—Miss M. Nixon.

**IV. (10s.)**—Miss M. Bomford.

**R.**—Miss Jennie Smith.

**V.H.C.**—Miss F. J. Keen.—Mrs. L. Scown.

**H.C.**—Miss K. Wookey.—Miss M. Hartley.

**C.**—Miss R. Hull.

Class 195.—*For winners of first and second Prizes in the Butter-making Classes* 189 *to* 194, *and* 199 *to* 202, *or at any previous meeting of the Show. On the fifth day of Show.* [18 entries.]

**I. (Gold Medal.)**—Miss Stratton.

**II. (Silver Medal.)**—Miss Kington.

**III. (Bronze Medal.)**—Miss C. Perkins.

**R.**—Miss E. Parry.

**V.H.C.**—Miss E. James.—Miss J. James.—Miss C. Pantall.—Mrs. E. Watts.—Mrs. W. Watts.—Miss N. Jones.

**H.C.**—Miss R. James.—Mrs. F. J. K. Fowler.—Miss Jackson.

**C.**—Miss M. Hartley.—Miss B. T. Weekes.

## MILKING.

Class 196.—*For Men* 18 *years of age and over.* [2 entries.]

**II. (£1.)**—T. W. Jones.

Class 197.—*For Women* 18 *years of age and over.* [12 entries.]

**I. (£1 10s.)**—Mrs. T. Miles.

**II. (£1.)**—Miss E. James.

**III. (15s.)**—Miss S. A. Morgan.

**IV. (10s.)**—Mrs. F. J. K. Fowler.
**R. & V.H.C.**—Miss L. G. Gabb.
**H.C.**—Mrs. M. Jones.
**C.**—Miss E. Addis.—Mrs. A. Watkins.

Class 198.—*For Boys and Girls under* 18 *years of age.* [4 entries.]

**I. (£1 10s.)**—Miss N. Jones.
**II. (£1.)**—Miss M. Shepherd.
**III. (15s.)**—W. Leighton.
**IV. (10s.)**—Miss M. Eacock.

## STOCK JUDGING.

*Herefordshire Students' Competition,* 21*st May,* 1915. [9 entries.]

**I. (£1 10s.)**—T. Parker, Sidnall, Pencombe, Worcester.
**II. (£1.)**—I. Price, Knoakes Court, Leominster.
**III. (15s.)**—W. J. Edwards, Court House, Presteign.
**IV. (10s.)**—C. Roper, Church Farm, Tyberton, Hereford.
**R.**—B. Rogers, Stansbatch, Staunton-on-Arrow.
**V.H.C.**—J. C. Edwards, Widgeon Hill, Leominster.
**H.C.**—R. Edwards, Staunton-Old-Court, Staunton-on-Arrow.
**H.C.**—J. R. Cowell, Callows Hill, Ledbury.
**H.C.**—J. Phillips, Drayton, Brimfield, Herefordshire.

# Bath and West and Southern Counties Society.

## OBJECTS OF THE SOCIETY AND PRIVILEGES OF MEMBERSHIP.

### ANNUAL EXHIBITIONS.

THE Society annually holds an Exhibition in some city or town in England or Wales. Each section of the Society's district is visited at intervals, so that most Members have an opportunity of seeing the Show in their own neighbourhood every few years. Prizes to a large amount are given for Horses, Cattle, Sheep, Pigs, Farm Produce, &c. Provision is also made for the exhibition of Agricultural Implements and Machinery, Seeds, Cattle Foods, Artificial Manures, and articles of general utility. A substantially built and completely equipped Working-Dairy on a large scale is a special feature of these Exhibitions. Here explanatory demonstrations, and comparative tests of implements and processes are carried on with the assistance of well-known practical and scientific experts, and Butter-making Competitions are held. Among the features of the Annual Meeting are Shoeing, Milking and other Competitions, Poultry and Horticultural Shows, and Exhibitions illustrative of Bee-keeping, Home Industries, Art-Manufactures, Nature Study and Forestry.

*Membership entitles to free admission to the Annual Exhibition, and also to the Grand Stand overlooking the Horse and Cattle Ring, to the Reserved Seats in the Working Dairy, and to the use of the Members' Special Pavilion for Luncheons, Reading, Writing, &c.*

*Entries can be made by Members (elected on or before the last Tuesday in January preceding the Show) at half the Fees payable by Non-Members.*

### THE JOURNAL.

*All Members receive free of charge the Society's Journal, which is published annually bound in cloth.* It has for its aim the dissemination of agricultural knowledge in a popular form, and in addition to original articles by well-known agricultural authorities, it contains particulars of the Society's general operations, full reports of its experimental and research work, prize awards, financial statements, lists of Members, reviews of new books on agriculture, &c. (The price of the *Journal* to non-Members is 6s. 5d. post free.)

### CHEMICAL AND OTHER FACILITIES.

The Society has a Consulting Chemist, *from whom Members can obtain analyses and reports at reduced rates of charge.* An arrangement has also been made under which Members of the Society can obtain, free of charge, from the National Fruit and Cider Institute at Long Ashton, analyses of cider-apples and perry-pears, and, with a view to assisting farmers and others in dealing with insect and other pests which affect agriculture, horticulture, &c., the Council have availed themselves of an offer from the Board of Economic Biology of the University of Bristol, to investigate the nature of any insect or other pest and report upon it free of charge.

### EXPERIMENTS.

Experiments on crops are conducted at experimental stations in various parts of the Kingdom, and *Members are enabled to take part in these and to receive reports thereon.*

## ART-MANUFACTURES, NATURE STUDY, FORESTRY, &c.

One of the objects for which the Society was founded was the encouragement of Arts as well as Agriculture, and, to this end, exhibitions are held of Art-Manufactures and of work representative of Arts and Handicrafts. Exhibitions are also held illustrating Nature Study, as a branch of Education; the Science of Forestry, &c.

## TERMS OF MEMBERSHIP.

### ANNUAL SUBSCRIPTIONS.

| | |
|---|---|
| Governors, not less than .. .. .. .. | £2 |
| Ordinary Members, not less than .. .. .. | £1 |
| Tenant Farmers, the rateable value of whose holdings does not exceed £200 a-year, not less than .. .. | 10s. |

Governors who are eligible for election as President, or Vice-President, are entitled, in addition to the privileges already mentioned, to an extra Season Ticket for the Annual Exhibition and to the Grand Stand, &c. Governors subscribing more than £2 are entitled to a further Ticket for every additional £1 subscribed.

Members subscribing less than £1 are entitled to all the privileges of Membership except that of entering Stock at reduced fees, and their admission Ticket for the Annual Show is available for *one day only* instead of for the whole time of the Exhibition.

### LIFE COMPOSITIONS.

Governors may compound for their Subscription for future years by payment in advance, of £20; and Members by payment, in advance, of £10. Governors and Members who have subscribed for twenty years may become Life Members on payment of half these amounts.

Any person desirous of joining the Society can be proposed by a Member, or by

Thos. F. Plowman,
Secretary and Editor,

3, Pierrepont Street, Bath.

**Telegraphic Address—"Plowman, Bath."**

**Telephone No. 610.**

# Bath and West and Southern Counties Society.

## GENERAL LAWS.

*As revised in accordance with the Report of a Special Committee; which Report was received and adopted by the Annual General Meeting of Members, held on May* 30, 1895.

### COMPOSITION OF THE SOCIETY.

I. The Society shall consist of a President, Vice-Presidents, Trustees, Council, Treasurer, Secretary, and Members.

### OBJECTS.

II. The Society shall have the following objects :—

*a.* To hold Exhibitions of breeding stock, agricultural implements, and such other articles connected with agriculture, arts, manufactures or commerce, as may be determined upon by the Council.

*b.* To conduct practical and scientific investigations in agriculture.

*c.* To promote technical education in agriculture by providing means of systematic instruction.

*d.* To publish a Journal for circulation.

### SUBSCRIPTIONS.

III. The Annual Subscription for Members shall be as follows :—

| | |
|---|---|
| Governors (who are eligible for election as President or Vice-President), not less than .. .. .. .. .. | £2 |
| Ordinary Members, not less than .. .. .. .. | £1 |
| Tenant Farmers (the rateable value of whose holdings does not exceed £200 a-year), not less than .. .. .. .. | 10*s.* |

IV. The payment of £20 in one sum shall constitute a Governor for life, and of £10 in one sum an Ordinary Member for life ; but any Governor who has subscribed not less than £2 annually for a period of twenty years may become a Life Governor on the further payment of £10 in one sum ; and any Ordinary Member, who has subscribed not less than £1 annually for the same period may become a Life-Member on the further payment of £5 in one sum.

V. Subscriptions shall become due and be payable in advance on the 1st of January in each year or as soon as the Subscriber has been elected a Member. When the election takes place during the last quarter of the year the subscription payable on election will be considered as applying to the ensuing year.

VI. A Member shall be liable to pay his subscription for the current year unless he shall have given notice, in writing, to the Secretary before January 1st of his intention to withdraw.

### GOVERNING BODY.

VII. The entire management of the Society—including the making of Bye-laws, election of Members, determining the Prizes to be awarded, appointing Committees, fixing the Places of Meetings and Exhibitions, appointing or removing the Treasurer, Secretary, and such other officers as may be required to carry on the business of the Society—shall be vested in the Council, who shall report its proceedings at the Annual Meetings of the Society.

VIII. The Council shall consist of the Patron (if any), President, Vice-Presidents, Trustees, and Treasurer (who shall be *ex-officio* Members), and of sixty-six elected Members.

## ELECTION OF PRESIDENT, VICE-PRESIDENTS, TRUSTEES, AND COUNCIL.

IX. The election of a President for the year, of any additional Vice-Presidents or Trustees, and of the Members of Council representing the Divisions named in Law X., shall take place at the Annual Meeting of the Society, and they shall enter into office at the conclusion of the Exhibition during which such Annual Meeting has been held.

X. The sixty-six Members of the Council referred to in Laws VIII. and IX. shall consist of fifty-eight persons residing or representing property in the following Divisions, viz.:—

Twelve from the Counties of Devon and Cornwall, which shall be called the Western Division;

Twenty-four from the Counties of Somerset, Dorset, and Wilts, which shall be called the Central Division;

Twelve from the Counties of Hants, Berks, Oxon, Bucks, Middlesex, Surrey, Sussex, and Kent, which shall be called the Southern Division; and

Ten from the Counties of Worcester, Gloucester, Hereford and Monmouth, and the Principality of Wales, which shall be called the North-Western Division.

The remaining eight shall be elected (irrespective of locality) from the general body of members, and shall form a Division which shall be called the "Without Reference to District" Division.

XI. One-half of the elected Members in each of the five Divisions named in Law X. shall retire annually by rotation, but shall be eligible for re-election.

XII. The Council shall have power to nominate a President, Vice-Presidents, Trustees, and Members of Council for the approval of the Annual Meeting, and to fill up such vacancies in their own body as are left after the Annual Meeting, or as may from time to time occur during the interval between the Annual Meetings.

XIII. Nominations to offices, election to which is vested in the whole body of Members, must reach the Secretary ten days before the meeting at which such vacancies are to be filled up.

## MEETINGS.

XIV. The Annual Meeting of the Society shall take place during the holding of the annual Exhibition.

XV. Special General Meetings of the Society may be convened by the President on the written requisition of not less than three Members of Council; and all Members shall have ten days' notice of the object for which they are called together.

XVI. No Member of less than three months' standing, or whose subscription is in arrear, shall be entitled to vote at a Meeting.

## EXHIBITIONS.

XVII. The Annual Exhibitions of the Society shall be held in different Cities or Towns in successive years.

XVIII. All Exhibitors shall pay such fees as may be fixed by the Council. Members subscribing not less than £1 per annum, who have been elected previous to February 1st, and have paid the subscription for the current year, shall be entitled to exhibit at such reduction in these fees as the Council shall determine.

## PRIZES.

XIX. All prizes offered at the cost of the Society shall be open for competition to the United Kingdom.

XX. No person intending to compete for any prize offered at the annual Exhibition shall be eligible to act as a judge or to have any voice in the selection of judges to award the premiums in the department in which he exhibits.

XXI. If it be proved to the satisfaction of the Council that any person has attempted to gain a prize in this, or in any other society, by a false certificate or by a misrepresentation of any kind, such person shall thereupon be, for the future, excluded from exhibiting in this Society.

## JOURNAL.

XXII. The Proceedings of the Society, Awards of Prizes, Financial Statements and Lists of Officers, Governors, and Members, shall be printed annually in the Society's *Journal*, and every Governor and Member, not in arrear with his subscription, shall be entitled to receive one copy, free of expense, and there shall be an additional number printed for sale.

## POLITICS.

XXIII. No subject or question of a political tendency shall be introduced at any Meeting of this Society.

## ALTERATIONS IN LAWS.

XXIV. No new General Law shall be made or existing one altered, added to or rescinded, except at an Annual or Special General Meeting, and then only provided that a statement of particulars, in writing, shall have been sent to the Secretary at least twenty-one days previous to the Meeting at which the question is to be considered.

# List of Officers,

1915-1916.

## PATRON.

HIS MOST GRACIOUS MAJESTY THE KING

## PRESIDENT.

THE RIGHT HON. THE EARL OF COVENTRY.

## TRUSTEES.

*Bath, The Marquis of, Longleat, Warminster.
Acland, Sir C. T. D., Bart., Killerton, Exeter.
Edwards, C. L. F., The Court, Axbridge, Somerset.

## VICE-PRESIDENTS.

| | |
|---|---|
| Acland, Sir C. T. D., Bart. | Killerton, Exeter |
| Allen, J. D. | Springfield House, Shepton Mallet |
| Badcock, H. J. | Broadlands, Taunton |
| *Bath, Marquis of | Longleat, Warminster |
| *Beaufort, Duke of | Badminton, Chippenham |
| Benyon, J. Herbert | Englefield House, Reading |
| *Bute, The Marquis of | The Castle, Cardiff |
| *Clinton, Lord | Heanton Satchville, Dolton, N. Devon |
| Devonshire, Duke of | Chatsworth, Derbyshire |
| *Digby, Lord | Minterne, Cerne Abbas |
| *Ducie, Earl of | Tortworth, Falfield, R.S.O. |
| Edwards, C. L. F. | The Court, Axbridge, Somerset |
| *Falmouth, Viscount | Tregothnan, Truro |
| Fitzhardinge, Lord | Cranford, Hounslow |
| Gibbons, G. | Tunley Farm, nr. Bath |
| Hambleden, Viscount | Greenlands, Henley-on-Thames |
| Hobhouse, Right Hon. H. | Hadspen House, Castle Cary |
| *Lansdowne, Marquis of, K.G. | Bowood, Calne |
| *Llewelyn, Sir J. T. D., Bart. | Penllergaer, Swansea |
| Moreton, Lord | Sarsden House, Chipping Norton |
| *Mount-Edgcumbe, Earl of | Mount Edgcumbe, Devonport |
| Neville-Grenville, R. | Butleigh Court, Glastonbury |
| Northumberland, Duke of | Albury Park, Guildford |
| *Plymouth, Earl of | Hewell Grange, Bromsgrove |

⁂ Those to whose names an asterisk (*) is prefixed have filled the office of President.

### Vice-Presidents—*continued.*

| | |
|---|---|
| Poltimore, Lord | Poltimore Park, Exeter |
| *Portman, Viscount | Bryanston, Blandford |
| *Radnor, Earl of | Longford Castle, Salisbury |
| Shelley, Sir J., Bart. | Shobrooke Park, Crediton |
| Somerset, Duke of | Maiden Bradley, Bath |
| Strachie, Lord | Sutton Court, Pensford, Somerset |
| Temple, Earl | Newton St. Loe, Bristol |
| Waleran, Lord | Bradfield, Cullompton |

The Lord Warden of the Stannaries.

The Secretary and Keeper of the Records of the Duchy of Cornwall.

The Receiver-General of the Duchy of Cornwall.

*** Those to whose names an asterisk (*) is prefixed have filled the office of President.

# MEMBERS OF COUNCIL.

## EX-OFFICIO MEMBERS.

The Patron.
The President.

The Vice-Presidents.
The Trustees.
The Treasurer.

## ELECTED MEMBERS.

### WESTERN DIVISION (Devon and Cornwall).

(12 *Representatives.*)

*Elected in* 1914.

| *Name.* | *Address.* |
|---|---|
| Bayly, J. | Highlands, Ivy Bridge, S. Devon |
| Buckingham, Rev. Preb. | The Rectory, Doddiscombsleigh, Exeter |
| Gibbs, A. H. | Pytte, Clyst St. George, Topsham, Devon |
| Moore-Stevens, Col. R. A. | Winscott, Torrington, Devon |
| Shelley, J. F. | Posbury House, Crediton |
| Studdy, T. E. | Mazonet, Stoke Gabriel, Totnes |

*Elected in* 1915.

| *Name.* | *Address.* |
|---|---|
| Boscawen, Rev. A. T. | Ludgvan Rectory, Long Rock, R.S.O., Cornwall |
| Daw, J. E. | Exeter |
| Leverton, W. | Woolleigh Barton, Beaford, N. Devon |
| Lopes, Sir Henry Y. B., Bart. | Maristow, Roborough, S. Devon |
| Martyn G. | Liskeard, Cornwall |
| Sillifant, A. O. | Culm Leigh, Stoke Canon, Exeter |

### CENTRAL DIVISION (Somerset, Dorset, and Wilts).

(24 *Representatives.*)

| | |
|---|---|
| Fox, R. A. | Yate House, Yate, Glos. |
| Gibson, J. T. | Claverham, Yatton |
| Maule, M. St. J. | Chapel House, Bath |
| Napier, H. B. | Long Ashton, Clifton, Bristol |
| Nichols, G. | 49, Broad Street, Bristol |
| Parry-Okeden, Lt.-Col. U. E. P. | Turnworth, Blandford, Dorset |
| Sanders, R. A., M.P. | Barwick House, Yeovil |
| Sherston, Major C. D. | Evercreech, Bath |
| Storrar, J. I. | Grittleton, Chippenham |
| Tudway, C. C. | The Cedars, Wells, Somt. |
| Wynford, Lord | Warmwell, Dorchester |

| | |
|---|---|
| Clark, W. H. | Rutland Cottage, Combe Down, Bath |
| Farwell, E. W. | 11, Laura Place, Bath |
| Gordon, G. H. | The Barn House, Sherborne, Dorset |
| Hill, V. T. | Mendip Lodge, Langford, Bristol |
| Hoare, Sir H. H. A., Bart. | Stourhead, Zeals, S.O., Wilts |
| Hurle, J. C., | Brislington Hill, Bristol |
| Knight, S. J. | Walnut Farm, East Dundry, Bristol |
| Rawlence, E. A. | Newlands, Salisbury |
| Rawlence, G. N. | 7, Moberley Road, Salisbury |
| Somerville, A. F. | Dinder House, Wells |
| Watson, Hon. T. H., | Cormiston, Milverton, Somt. |
| White, A. R. | Charnage, Mere, Wilts |

### SOUTHERN DIVISION (Hants, Berks, Oxon, Bucks, Middlesex, Surrey, Sussex and Kent).

(12 *Representatives.*)

| | |
|---|---|
| Best, Major T. G. | East Carleton Manor, Norwich |
| Byng, Col. Hon. C. | 70, Ashley Gardens, London, S.W. |
| Jervoise, F. H. T. | Herriard Park, Basingstoke |
| Latham, T. | Dorchester, Oxon |
| Rutherford, J. A. | Highclere Estate Office, Newbury |
| Sutton, E. P. F. | Sidmouth Grange, nr. Reading |

| | |
|---|---|
| Ashcroft, W. | 13, The Waldrons, Croydon |
| Burrell, Sir M. R., Bart. | Knepp Castle, Horsham, Sussex |
| Cobb, H. M. | Higham, Kent |
| Cundall, H. M., I.S.O., F.S.A. | 4, Marchmont Gardens, Richmond, Surrey |
| Drummond, H. W. | 3, Bryanston Square, London, W. |
| Llewellyn, L. T. E. | Hackwood, Basingstoke |

### NORTH-WESTERN DIVISION (Worcestershire, Gloucestershire, Herefordshire, Monmouthshire and Wales).

(10 *Representatives.*)

| | |
|---|---|
| Allsebrook, A | Link Elm, Malvern Link |
| Best, Capt. W. | Vivod, Llangollen |
| Cotterell, Sir J., Bart. | Garnons, Hereford |
| Lipscomb, G. | Margam Park Estate Office, Port Talbot |
| Mason, F. F. | Swansea |

| | |
|---|---|
| Alexander, D. | Cardiff |
| Alexander, H. G. | 5, High Street, Cardiff |
| Baker, G. E. Lloyd | Hardwicke Court, Gloucester |
| Bathurst, C., M.P. | Lydney Park, Gloucester |
| Drummond, Col. F. D. W. | Cawdor Estate Office, Carmarthen |

### WITHOUT REFERENCE TO DISTRICT DIVISION.

(8 *Representatives.*)

| | |
|---|---|
| Knollys, C. R. | Weekley, Kettering |
| Portman, Hon. C. B. | Goldicote, Stratford-on-Avon |

| | |
|---|---|
| Ackers, C. P. | Huntley Manor, Gloucester |
| Evans, H. M. G. | Plassissa, Llangennech, Carmarthen |
| Lewis, Col. H. | Green Meadow, near Cardiff |
| Williams, Jestyn | Llanover Estate, Newport, Mon. |

## STANDING COMMITTEES, 1915-1916.

[The PRESIDENT is *ex-officio* Member of all Committees.]

### ALLOTMENT.

EDWARDS, C. L. F., *Chairman.*

BATH, MARQUIS OF
BEST, CAPT. W.
BYNG, COL. HON. C.
GIBBONS, G.
MASON, F. F.
NAPIER, H. B.
STUDDY, T. E.
WYNFORD, LORD

### CONTRACTS.

NAPIER, H. B., *Chairman.*

ALLSEBROOK, A.
BATH, MARQUIS OF
BEST, CAPT. W.
DAW, J. E.
EDWARDS, C. L. F.
MASON, F. F.
NEVILLE-GRENVILLE, R.
RAWLENCE, G. N.
STUDDY, T. E.

### DAIRY

ACLAND, SIR C. T. D., Bart., *Chairman.*

SOMERVILLE, A. F., *Vice-Chairman.*

ALLEN, J. D.
ASHCROFT, W.
BOSCAWEN, REV. A. T.
CLARK, W. H.
GIBBONS, G.
GIBSON, J. T.
HURLE, J. COOKE
KNIGHT S. J.
LATHAM, T.
LLEWELLYN, L. T. E.
NAPIER, H. B.
NEVILLE-GRENVILLE, R.
STORRAR, J. I.
STRACHIE LORD
TUDWAY C. C.

### DISQUALIFYING.

THE STEWARDS OF LIVE STOCK AND PRODUCE.

### EXPERIMENTS AND EDUCATION.

ACLAND, SIR C. T. D., Bart., *Chairman.*

ALLEN, J. D.
ASHCROFT, W.
BAKER, G. E. LLOYD
BATHURST, C., M.P.
BENYON, J. H.
GIBBONS, G.
GIBSON, J. T.
HOBHOUSE, RT. HON. H.
HURLE, J. COOKE
LATHAM, T.
NEVILLE-GRENVILLE, R.
RAWLENCE, E. A.
RUTHERFORD, J. A.
SOMERVILLE, A. F.

(With power to add to their number.)

### FINANCE.

NAPIER, H. B., *Chairman.*

DAW, J. E.
GIBBS, A. H.

### FORESTRY.

LIPSCOMB, G., *Chairman.*

ACKERS, C. P.
ACLAND, SIR C. T. D., Bart.
CLINTON, LORD
DRUMMOND, COL. F. D. W.
DUCHESNE M. C.
EVANS, H. M. G.
NAPIER, H. B.
NORTH, G. F.
RUTHERFORD, J. A.
SUTTON, E. P. F.

## IMPLEMENT REGULATIONS.

Shelley, Sir J., Bart., *Chairman.*

Acland, Sir C. T. D., Bart.
Bath, Marquis of
Best, Capt. W.
Edwards, C. L. F.
Gibbons, G.
Martyn, G.
Mason, F. F.
Moore-Stevens, Col. R. A.
Napier, H. B.
Neville-Grenville, R.
Studdy, T. E.

## JOURNAL.

Acland, Sir C. T. D., Bart., *Chairman.*

Baker, G. E. Lloyd
Bathurst C., M.P.
Hobhouse, Right Hon. H.

## JUDGES' SELECTION.

Sillifant, A. O., *Chairman.*

Alexander, D.
Alexander, H. G.
Allen, J. D.
Ashcroft, W.
Byng, Col. Hon. C.
Gibbons, G.
Hoare Sir H. H. A., Bart.
Latham, T.
Moore-Stevens, Col. R. A.
Parry-Okeden, Lieut.-Col. U. E. P.
Shelley, Sir J., Bart.
Wynford, Lord

## RAILWAY ARRANGEMENTS AND ADVERTISEMENTS.

Alexander, D.
Coventry, Earl of
Drummond, H. W.
Mason, F. F.
Shelley Sir J., Bart.

(With power to add to their number.)

## SCIENCE AND ART.

Bath, Marquis of, *Chairman.*

Acland, Sir C. T. D., Bart.
Cundall, H. M. (I.S.O., F.S.A.)
Daw, J. E.
Evans, H. M. G.
Farwell, E. W.
Hobhouse, Rt. Hon. H.
Legard, A. G.
Lipscomb, G.
Llewelyn, Sir J. T. D., Bart.
Napier, H. B.
Rutherford, J. A.

(With power to add to their number.)

## SELECTION.

The Chairmen of all other Committees.

## SHOW PLACE AND DATE.

Chairmen of the Allotment, Contracts, Dairy, Finance, Forestry, Implement Regulations, Railway Arrangements, Science and Art, and Stock Prize Sheet Committees.

(With power to add two Local Members to their number.)

## STOCK PRIZE SHEET.

Sillifant, A. O., *Chairman.*

Alexander, D.
Alexander, H. G.
Allen, J. D.
Allsebrook, A.
Ashcroft, W.
Buckingham, Rev. Preb.
Byng, Col. Hon. C.
Clark, W. H.
Cotterell, Sir J., Bart.
Evans, H. M. G.
Gibbons, G.
Hoare, Sir H. H. A., Bart.
Latham, T.
Leverton, W.
Moore-Stevens, Col. R. A.
Shelley, Sir J., Bart.
White, A. R.
Williams, Jestyn
Wynford, Lord

## WORKS.

EDWARDS, C. L. F., *Chairman.*

BATH, MARQUIS OF
BEST, CAPT. W.
NAPIER, H. B.
STUDDY, T. E.

### Stewards.

*Cattle, Sheep and Pigs.*

BYNG, COL. HON. C.
ASHCROFT, W.
MOORE-STEVENS, COL. R. A.

*Cider.*

FARWELL, E. W.

*Dairy.*

GIBBONS, G. SOMERVILLE, A. F.

*Experiments.*

ASHCROFT, W.

*Finance.*

NAPIER, H. B. GIBBS, A. H.
DAW, J. E.

*Forestry.*

LIPSCOMB, G.

*Horses.*

ALEXANDER, D.
WYNFORD, LORD

*Horticulture.*

BOSCAWEN, REV. A. T.

*Poultry.*

STUDDY, T. E.

*Science and Art and Music.*

CUNDALL, H. M. (I.S.O., F.S.A.)

*Shoeing.*

LATHAM, T.

*Yard.*

EDWARDS, C. L. F.
BEST, CAPT. W.
BATH, MARQUIS OF
STUDDY, T. E.

## Other Honorary Officials.

*Treasurer*—LUTTRELL, C. M. F.

*Chaplain.*

BOSCAWEN, REV. A. T.

## Permanent Officials.

*Secretary and Editor*—PLOWMAN, THOMAS F.

*Associate Editor.*

LLOYD, F. J. (F.C.S.)

*Auditor.*

GOODMAN, F. C. (*Chartered Accountant*)

*Consulting Chemist.*

VOELCKER, Dr. J. A. (M.A., F.I.C.)

*Veterinary Inspector.*

PENBERTHY, Prof. J. (F.R.C.V.S.

*Superintendent of Works.*

AYRE, H. C.

# Annual Exhibitions.

| Year. | Place Visited. | Local Subscription. | Prizes. |  |  | Total Local Contribution. | President. | Admissions. |  |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | Local Committee. | Local Societies | Local Residents. |  |  | On 2/6 Days. | On 1/- Days. | Total. |
|  |  | £ | £ | £ | £ | £ |  |  |  |  |
| 1852 | Taunton | 210 | .. | .. | .. | 210 | Lord Portman | .. | .. | .. |
| 1853 | Plymouth | 450 | .. | .. | .. | 450 | Sir T. D. Acland, Bart. | .. | .. | .. |
| 1854 | Bath | 450 | .. | .. | .. | 450 | William Miles, M.P. | .. | .. | .. |
| 1855 | Tiverton | 450 | .. | .. | .. | 450 | Earl Fortescue | .. | .. | .. |
| 1856 | Yeovil | 450 | .. | .. | .. | 450 | C. A. Moody, M.P. | .. | .. | .. |
| 1857 | Newton Abbot | 700 | .. | .. | .. | 700 | Lord Courtenay | .. | .. | .. |
| 1858 | Cardiff | 800 | .. | .. | .. | 800 | Lord Courtenay | .. | .. | .. |
| 1859 | Barnstaple | 800 | 85 | .. | 81 | 966 | John Sillifant | .. | .. | .. |
| 1860 | Dorchester | 900 | .. | .. | .. | 900 | Lord Rivers | 10,709 | 11,949 | 22,658 |
| 1861 | Truro | 900 | .. | .. | .. | 900 | J. W. Buller, M.P. | 15,201 | 14,220 | 29,421 |
| 1862 | Wells | 900 | .. | .. | .. | 900 | Sir T. D. Acland, Bart. | 10,578 | 4,775 | 15,353 |
| 1863 | Exeter | 900 | .. | .. | .. | 900 | Marquis of Bath | 15,635 | 19,284 | 34,919 |
| 1864 | Bristol | 1000 | 106 | .. | 50 | 1156 | Earl Fortescue | 22,377 | 65,678 | 88,055 |
| 1865 | Hereford | 900 | 358 | .. | .. | 1258 | Lord Taunton | 16,575 | 35,261 | 51,836 |
| 1866 | Salisbury | 900 | 57 | .. | .. | 957 | Earl of Portsmouth | 7,288 | 18,737 | 26,025 |
| 1867 | Salisbury | .. |  |  |  |  | J. Tremayne | 7,502 | 16,702 | 24,204 |
| 1868 | Falmouth | 900 | .. | .. | .. | 900 | Sir J. T. B. Duckworth, Bart. | 11,393 | 19,495 | 30,888 |
| 1869 | Southampton | 900 | 132 | .. | 18 | 1050 | Earl of Carnarvon | 15,340 | 41,290 | 56,630 |
| 1870 | Taunton | 900 | .. | .. | .. | 900 | Sir S. H. Northcote, Bart., C.B., M.P. | 17,952 | 33,653 | 51,605 |
| 1871 | Guildford | 900 | 110 | .. | .. | 1010 | Earl of Cork | 10,656 | 23,406 | 34,062 |
| 1872 | Dorchester | 800 | .. | .. | 10 | 810 | Duke of Marlborough, K.G. | 12,791 | 21,517 | 34,308 |
| 1873 | Plymouth | 800 | .. | 400 | .. | 1200 | Earl of Mount-Edgcumbe. | 16,665 | 45,744 | 62,409 |
| 1874 | Bristol | 800 | 403 | .. | .. | 1203 | Sir Massey Lopes, Bart., M.P. | 37,329 | 72,791 | 110,120 |
| 1875 | Croydon | 800 | 245 | .. | .. | 1045 | R. Benyon, M.P. | 14,518 | 26,028 | 40,546 |
| 1876 | Hereford | 800 | 381 | .. | .. | 1181 | Earl of Ducie | 16,396 | 32,645 | 49,041 |
| 1877 | Bath | 800 | 215 | .. | .. | 1015 | Marquis of Lansdowne | 27,625 | 48,852 | 76,477 |
| 1878 | Oxford | 800 | .. | 170 | 6 | 976 | Earl of Jersey | 12,414 | 26,995 | 39,409 |

## ANNUAL EXHIBITIONS—*continued.*

| Year. | Place Visited. | Local Subscription. | Prizes. | | | Total Local Contribution. | President. | Admissions. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Local Committee. | Local Societies | Local Residents. | | | On 5/- Day. | On 2/6 Days. | On 1/- Days. | Total. |
| | | £ | £ | £ | £ | £ | | | | | |
| 1879 | Exeter . . | 800 | .. | .. | 10 | 810 | Earl of Morley . . . | .. | 14,634 | 40,533 | 55,167 |
| 1880 | Worcester . | 800 | .. | 254 | .. | 1054 | Earl of Coventry . . | .. | 8,415 | 37,675 | 46,090 |
| 1881 | Tunbridge Wells | 800 | 245 | 34 | .. | 1079 | Marquis of Abergavenny. . | .. | 13,368 | 33,236 | 46,604 |
| 1882 | Cardiff . . | 800 | 200 | 198 | 17 | 1215 | Lord Tredegar . . . | .. | 23,941 | 38,680 | 62,621 |
| 1883 | Bridgwater . | 800 | 78 | .. | .. | 878 | Lord Brooke, M.P. . . . | .. | 17,171 | 31,241 | 48,412 |
| 1884 | Maidstone . | 800 | 310 | 33 | 75 | 1218 | Viscount Holmesdale . . | .. | 13,501 | 31,053 | 44,554 |
| 1885 | Brighton . | 800 | 227 | 33 | 82 | 1142 | Viscount Hampden . . | .. | 9,637 | 39,851 | 49,488 |
| 1886 | Bristol . . | 800 | 525 | .. | .. | 1325 | Lord Carlingford . . . | .. | 29,580 | 70,999 | 100,579 |
| 1887 | Dorchester . | 800 | .. | 112 | .. | 912 | Earl of Ilchester . . . | .. | 8,860 | 29,846 | 38,706 |
| 1888 | Newport (Mon.) | 800 | 100 | .. | .. | 900 | Lord Tredegar . . . | .. | 14,878 | 38,567 | 53,445 |
| 1889 | Exeter . . | 800 | .. | .. | 10 | 810 | Lord Clinton . . . . | .. | 16,405 | 36,195 | 52,600 |
| 1890 | Rochester . | 800 | 294 | .. | 26 | 1120 | Earl of Darnley . . . | .. | 3,480 | 48,314 | 51,794 |
| 1891 | Bath . . | 800 | 50 | 103 | 100 | 1053 | Earl Temple . . . . | .. | 23,510 | 52,185 | 75,695 |
| 1892 | Swansea . . | 800 | 200 | 100 | 10 | 1110 | Sir J. D. T. Llewelyn, Bart. . | .. | 18,364 | 54,609 | 72,973 |
| 1893 | Gloucester . | 800 | 400 | .. | .. | 1200 | Lord Fitzhardinge . . . | .. | 14,272 | 40,368 | 54,640 |
| 1894 | Guildford . | 800 | 174 | .. | 10 | 934 | Earl of Onslow . . . | .. | 8,671 | 29,813 | 38,484 |
| 1895 | Taunton . . | 800 | 85 | 160 | 10 | 1055 | Viscount Portman . . . | .. | 13,181 | 30,111 | 43,292 |
| 1896 | St. Albans . | 800 | 152 | .. | .. | 952 | Earl of Clarendon . . . | .. | 12,056 | 22,380 | 34,436 |
| 1897 | Southampton . | 800 | 50 | .. | .. | 850 | Lord Montagu of Beaulieu . | .. | 8,284 | 33,750 | 42,034 |
| 1898 | Cardiff . . | 800 | 200 | .. | .. | 1000 | Lord Windsor . . . | .. | 13,101 | 42,501 | 55,602 |
| 1899 | Exeter . . | 800 | .. | 225 | 5 | 1030 | Lord Clinton . . . . | .. | 16,091 | 39,832 | 55,923 |
| 1900 | Bath . . | 800 | 100 | 150 | 10 | 1060 | Marquis of Bath . . . | 954 | 11,601 | 36,814 | 49,369 |
| 1901 | Croydon . . | 800 | 115 | .. | .. | 915 | H.R.H. The Duke of Cornwall and York, K.G. . . | 1,196 | 9,362 | 30,693 | 41,251 |
| 1902 | Plymouth . | 800 | 105 | 100 | 36 | 1041 | Earl of Morley . . . | 842 | 12,629 | 40,565 | 54,036 |
| 1903 | Bristol . . | 800 | 434 | 50 | 61 | 1345 | Duke of Beaufort . . . | .. | 34,528 | 74,352 | 108,880 |
| 1904 | Swansea . . | 800 | 350 | .. | .. | 1150 | Lord Windsor . . . | .. | 28,265 | 50,562 | 78,827 |

## ANNUAL EXHIBITIONS—*continued.*

| Year. | Place Visited. | Local Subscription. | Prizes. | | | Total Local Contribution. | President. | Admissions. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Local Committee. | Local Societies. | Local Residents. | | | On 5/- Day. | On 2/6 Days. | On 1/- Days. | Total. |
| | | £ | £ | £ | £ | £ | | | | | |
| 1905 | Nottingham | 800 | .. | 218 | .. | 1018 | Duke of Portland, K.G. | .. | 8,913 | 45,964 | 54,877 |
| 1906 | Swindon | 800 | .. | 200 | 50 | 1050 | Earl of Radnor | .. | 7,838 | 42,013 | 49,851 |
| 1907 | Newport (Mon.) | 800 | 201 | 51 | 29 | 1081 | H.R.H. The Prince of Wales, K.G. | .. | 16,236 | 37,819 | 54,055 |
| 1908 | Dorchester | 800 | 100 | 25 | .. | 925 | Lord Digby | .. | 12,227 | 20,350 | 32,577 |
| 1909 | Exeter | 800 | .. | 100 | .. | 900 | Lord Clinton | .. | 14,898 | 41,891 | 56,789 |
| 1910 | Rochester and Chatham | 800 | 117 | .. | .. | 917 | Earl of Darnley | .. | 5,892 | 20,105 | 25,997 |
| 1911 | Cardiff | 800 | 195 | 110 | 10 | 1115 | Marquis of Bute | .. | 16,213 | 40,588 | 56,801 |
| 1912 | Bath | 800 | 100 | 100 | .. | 1000 | Marquis of Bath | .. | 13,843 | 40,935 | 54,788 |
| 1913 | Truro | 800 | 35 | 115 | 39 | 918 | Viscount Falmouth | .. | 12,918 | 44,700 | 57,618 |
| 1914 | Swansea | 800 | 301 | .. | .. | 1101 | Sir J. T. D. Llewelyn, Bart. | .. | 17,957 | 67,805 | 85,762 |
| 1915 | Worcester | 400 | .. | 257 | .. | 657 | The Earl of Coventry | .. | 7,760 | 28,013 | 35,773 |

# Members' Privileges.

## ANALYSES OF FERTILISERS, FEEDING STUFFS, WATERS, SOILS, &c.

*Applicable only to the case of Persons who are not commercially engaged in the manufacture or sale of any substance sent for Analysis).*

**Members of the Bath and West and Southern Counties Society, who may also be Members of other Agricultural Societies, are particularly requested in applying for Analyses, to state that they do so as Members of the first-named Society.**

The following are the rates of Charges for Chemical Analyses to Members of the Society.

These privileges are applicable only when the analyses are for *bona-fide* agricultural purposes, and are required by Members of the Society for their own use and guidance in respect of farms or land in their own occupation and within the United Kingdom

The analyses are given on the understanding that they are required for the individual and sole benefit of the Member applying for them, and must not be used for other persons, or for commercial purposes.

Land or estate agents, bailiffs, and others, when forwarding samples are required to state the names of those Members on whose behalf they apply.

Members are also allowed to send for analysis under these privileges any manures or feeding-stuffs to be used by their outgoing tenants, or which are to be given free of cost to their occupying tenants.

The analyses and reports may not be communicated to either vendor or manufacturer, except in cases of dispute.

Members are requested, when applying for an analysis, to quote the number in the subjoined schedule under which they wish it to be made.

| No. | | |
|---|---|---|
| 1. | —An opinion of the purity of bone-dust or oil-cake (each sample) . .. | 2*s.* 6*d.* |
| 2. | —An analysis of sulphate or muriate of ammonia, or of nitrate of soda, together with an opinion as to whether it be worth the price charged .. .. .. | 5*s.* |
| 3. | —An analysis of guano, showing the proportion of moisture, organic matter, sand, phosphate of lime, alkaline salts and ammonia, together with an opinion as to whether it be worth the price charged .. .. .. .. .. .. | 10*s.* |
| 4. | —An analysis of mineral superphosphate of lime for soluble phosphates only, together with an opinion as to whether it be worth the price charged .. .. | 5*s.* |
| 5. | —An analysis of superphosphate of lime, dissolved bones, &c., showing the proportions of moisture, organic matter, sand, soluble and insoluble phosphates, sulphate of lime, and ammonia, together with an opinion as to whether it be worth the price charged | 10*s.* |
| 6. | —An analysis of bone-dust, basic slag, or any other ordinary artificial manure, together with an opinion as to whether it be worth the price charged .. .. | 10*s.* |
| 7. | —An analysis of compound artificial manures, animal products, refuse substances used for manure, &c. .. .. .. .. .. .. | from 10*s.* to £1 |
| 8. | —An analysis of limestone, showing the proportion of lime .. .. .. | 7*s.* 6*d.* |
| 9. | —An analysis of limestone, showing the proportion of lime and magnesia .. | 10*s.* |
| 10. | —An analysis of limestone or marls, showing the proportion of carbonate, phosphate, and sulphate of lime and magnesia, with sand and clay .. .. .. | 10*s.* |
| 11. | —Partial analysis of a soil, including determinations of clay, sand, organic matter, and carbonate of lime .. .. .. .. .. .. .. | £1 |
| 12. | —Complete analysis of a soil .. .. .. .. .. .. | £3 |
| 13. | —An analysis of oil-cake or other substance used for feeding purposes, showing the proportion of moisture, oil, mineral matter, albuminous matter, and woody fibre as well as of starch, gum, and sugar in the aggregate; and an opinion of its feeding and fattening or milk-producing properties.. .. .. .. .. | 10*s.* |
| 14. | —Analysis of any vegetable product .. .. .. .. .. .. .. | 10*s.* |
| 15. | —Determination of the "hardness" of a sample of water before and after boiling | 5*s.* |
| 16. | —Analysis of water of land-drainage, and of water used for irrigation .. .. | £1 |
| 17. | —Analysis of water used for domestic purposes .. .. .. .. .. | £1 10*s.* |
| 18. | —An analysis of milk (to assist Members in the management of their Dairies and Herds, *bona-fide* for their own information and not for trade purposes, nor for use in connection with the Sale of Food and Drugs Acts) .. .. .. .. | 5*s.* |
| 19. | —Personal consultation with the Consulting Chemist. (To prevent disappointment it is suggested that Members desiring to hold a consultation with the Consulting Chemist should write to make an appointment) .. .. .. .. | 5*s.* |
| 20. | —Consultation by letter .. .. .. .. .. .. .. | 5*s.* |
| 21. | —Consultation necessitating the writing of three or more letters .. .. | 10*s.* |

**Members wishing to exercise their privileges on the above-named terms, should forward their samples for examination *by post or parcel prepaid*, to the Consulting Chemist, DR. JOHN AUGUSTUS VOELCKER, M.A., F.I.C., Stuart House, 1, Tudor Street, London, E.C.**

**The fees for analysis must be sent to the Consulting Chemist at the time of application.**

# GUIDE TO PURCHASERS OF FERTILISERS AND FEEDING STUFFS.

Purchasers are recommended in every case to insist upon having an *Invoice* given to them. This invoice should set out clearly :—

In the case of **Fertilisers**—
(1.) the **name** of the fertiliser ;
(2.) whether the fertiliser be artificially **compounded** or not ;
(3.) the **analysis** guaranteed in respect of the principal fertilising ingredients.

In the case of **Feeding-Stuffs**—
(1.) the **name** of the article ;
(2.) the **description** of the article ; whether it has been made from one substance or seed only, or from more than one
(3.) the **analysis** guaranteed in respect of Oil and Albuminoids.

(NOTE.—The use of the terms " Linseed-cake," " Cotton-cake," &c., implies that these cakes shall be " pure," and purchasers are recommended to insist upon these terms being used without any qualification such as " 95 per cent.," " as imported," &c. " Oil-cake " should be avoided.

Members of the Society should see that the **Invoices** agree accurately with the orders given by them, and, in giving these orders, they should stipulate that the goods come up to the guarantees set out in the following list, and that they be sold **subject to the analysis and report of the Consulting Chemist of the Bath and West and Southern Counties Society.**

## FERTILISERS.

**Raw Bones, Bone-meal,** or **Bone-dust** to be guaranteed " PURE," and to contain not less than 45 per cent. of Phosphate of Lime, and not less than 4 per cent. of Ammonia.

**Steamed** or " **Degelatinised** " **Bones** to be guaranteed " PURE," and to contain not less than 55 per cent. of Phosphate of Lime, and not less than 1 per cent. of Ammonia.

**Mineral Superphosphate of Lime** to be guaranteed to contain a certain percentage of " Soluble Phosphate." [From 25 to 28 per cent. of Soluble Phosphate is an ordinarily good quality.]

**Dissolved Bones** to be guaranteed to be " made from raw bone and acid only," and to be sold as containing stated percentages of Soluble Phosphate, Insoluble Phosphates, and Ammonia.

**Compound Artificial Manures, Bone Manures, Bone Compounds, &c.,** to be sold by analysis stating the percentages of Soluble Phosphate, Insoluble Phosphates, and Ammonia contained.

**Basic Slag** to be guaranteed to contain a certain percentage of Phosphoric Acid, and to be sufficiently finely ground that 80 to 90 per cent. passes through a sieve having 10,000 meshes to the square inch.

**Peruvian Guano** to be described by that name, and to be sold by analysis stating the percentages of Phosphates and Ammonia.

**Sulphate of Ammonia** to be guaranteed to be " PURE," and to contain not less than 24 per cent. of Ammonia.

**Nitrate of Soda** to be guaranteed to be " PURE," and to contain 95 per cent. of Nitrate of Soda.

**Kainit** to be guaranteed to contain 23 per cent of Sulphate of Potash.

**All fertilisers to be delivered in good and suitable condition for sowing.**

## FEEDING-STUFFS.

**Linseed Cake, Cotton Cake** (Decorticated and Undecorticated), and **Rape Cake** (for feeding purposes) to be pure, i.e., prepared *only* from one kind of seed from which their name is derived, and to be in sound condition. The report of the Consulting Chemist of the Bath and West and Southern Counties Society to be conclusive as to the "purity" or otherwise of any feeding-stuffs. The percentages of Oil and Albuminoids must also be guaranteed.

**Mixed Feeding Cakes, Meals, &c.**, to be sold on a guaranteed analysis.

All Feeding-Stuffs to be sold in sound condition, and to contain nothing of an injurious nature or worthless for feeding purposes.

# INSTRUCTIONS FOR SELECTING AND SENDING SAMPLES FOR ANALYSIS.

## GENERAL RULES.

1.—A sample taken for analysis should be fairly *representative of the bulk* from which it has been drawn.

2.—The sample should reach the Analyst *in the same condition* as it was at the time when drawn.

## FERTILISERS.

When **Fertilisers** are delivered in bags, select four or five of these from the bulk, and either turn them out on a floor and rapidly mix their contents, or else drive a shovel into each bag and draw out from as near the centre as possible a couple of shovelfuls of the manure, and mix these quickly on a floor.

Halve the heap obtained in either of these ways, take one-half (rejecting the other) and mix again rapidly, flattening down with the shovel any lumps that appear. Repeat this operation until at last only some three or four pounds are left.

From this fill three tins, holding from ½ lb. to 1 lb. each, mark, fasten up and seal each of these. Send one for analysis, and retain the others for reference.

Or,—the manure may be put into glass bottles provided with well-fitting corks; the bottles should be labelled and the corks sealed down. The sample sent for analysis can be packed in a wooden box and sent by post or rail.

When manures are delivered in bulk, portions should be successively drawn from *different parts* of the bulk, the heap being turned over now and again. The portions drawn should be thoroughly mixed, sub-divided, and, finally, samples should be taken as before, except that when the manure is coarse and bulky it is advisable to send larger samples than when it is in a finely-divided condition.

## FEEDING-STUFFS.

**Linseed, Cotton, and other Feeding Cakes.**—If a single cake be taken three strips should be broken off right across the cake and from the middle portion of it, one piece to be sent for analysis, and the other two retained for reference. Each of the three pieces should be marked, wrapped in paper, fastened up and sealed. The piece forwarded for analysis can be sent by post or rail.

A more satisfactory plan is to select four to six cakes from different parts of the delivery, then break off a piece about four inches wide from the middle of each cake, and pass these pieces through a cake-breaker. The broken cake should then be well mixed, and three samples of about 1 lb. each should be taken and put in tins or bags duly marked, fastened, and sealed as before. One of these lots should be sent for anaylsis, the remaining two being kept for reference. It is advisable, also, with the broken pieces, to send a small strip from an unbroken cake.

**Feeding Meals, Grain, &c.**—Handfuls should be drawn from the centre of half-a-dozen different bags of the delivery; these lots should then be well mixed, and three ½ lb. tins or bags filled from the heap, each being marked, fastened up, and sealed. One sample is to be forwarded for analysis and the others retained for reference.

## SOILS, WATERS, &c.

**Soils.**—Have a wooden box made, 6 inches in length and width, and from 9 to 12 inches deep, according to the depth of soil and subsoil of the field. Mark out in the field a space of about 12 inches square; dig round in a slanting direction a trench, so as to leave undisturbed a block of soil and its subsoil 9 to 12 inches deep; trim this block to make it fit into the wooden box, invert the open box over it, press down firmly, then pass a spade under the box and lift it up gently, turn over the box, nail on the lid, and send by rail. The soil will then be received in the position in which it is found in the field.

In the case of very light, sandy, and porous soils, the wooden box may be at once inverted over the soil and forced down by pressure, and then dug out.

**Waters.**—Samples of water are best sent in glass-stoppered Winchester bottles holding half a gallon. One such bottle is sufficient for a single sample. Care should be taken to have these scrupulously clean. In taking a sample of water for analysis it is advisable to reject the first portion drawn or pumped, so as to obtain a sample of the water when in ordinary flow. The bottle should be rinsed out with the water that is to be analysed, and it should be filled nearly to the top. The stopper should be secured with string, or be tied over with linen or soft leather. The sample can then be sent carefully packed either in a wooden box with sawdust, &c., or in a hamper with straw.

**Milk.**—A pint bottle should be sent in a wooden box.

## GENERAL INSTRUCTIONS.

**Time for Taking Samples.**—All samples, both of fertilisers and feeding-stuffs, should be taken as soon after their delivery as possible, and should reach the Analyst within *ten days* after delivery of the article. In every case it is advisable that the Analyst's certificate be received before a fertiliser is sown or a feeding-stuff is given to stock.

**Procedure in the event of the Vendor wishing Fresh Samples to be Drawn.**—Should a purchaser find that the Analyst's certificate shows a fertiliser or feeding-stuff not to come up to the guarantee given him, he may inform the vendor of the result and complain accordingly. He should then send to the vendor *one* of the two samples which he has kept for reference. If, however, the vendor should demand that a fresh sample be drawn, the purchaser must allow this, and also give the vendor an opportunity of being present, either in person or through a representative whom he may appoint. In that case, three samples should be taken in the presence of both parties with the same precautions as before described, *each* of which should be duly packed up, labelled and *sealed* by both parties. One of these is to be given to the vendor, one is to be sent to the Analyst, and the third is to be kept by the purchaser for reference or future analysis if necessary.

**All samples intended for the Consulting Chemist of the Society should be addressed (postage or carriage prepaid) to Dr. J. AUGUSTUS VOELCKER, M.A., F.I.C., Stuart House, 1, Tudor Street, New Bridge Street, London, E.C. Separate letters of instruction should be sent at the same time.**

# FINANCIAL STATEMENTS

FOR

# 1915

## *WITH ITEMS OF* 1914 *FOR COMPARISON.*

PAGES

SUMMARY OF THE CASH ACCOUNT ... ... lxxxiv-lxxxv
DETAILED CASH ACCOUNT ... ... ... ... lxxxvi-xcv
ASSETS AND LIABILITIES ... ... ... ... ... xcvi
STATEMENT SHOWING RESULT OF SHOW ... ... xcvii

# The Bath and West and

## SUMMARY OF THE CASH ACCOUNT

DR.

WITH COMPARATIVE

| Page of accompanying Cash Account. | RECEIPTS. | | 1915. Worcester. | | 1914. Swansea. |
|---|---|---|---|---|---|
| | | | £ s. d. | £ s. d. | £ s. d. |
| | **General :—** | | | | |
| lxxxvi | Dividends and Interest | | 721 10 7 | | 655 18 1 |
| lxxxvi | Subscriptions from Members | | 946 18 0 | | 984 2 0 |
| lxxxvi | Life Members | | 20 0 0 | | 20 0 0 |
| lxxxvi | Journal | | 33 8 3 | | 42 1 5 |
| lxxxvi | Miscellaneous | | 0 10 9 | | 0 8 7 |
| | | | | 1,722 7 7 | 1,702 10 1 |
| | **Show :—** | | | | |
| lxxxvi | Implements | | 1,400 4 6 | | 1,737 17 0 |
| | | £ s. d. | | | |
| lxxxviii | Horses | 576 1 6 | | | 789 7 9 |
| lxxxviii | Cattle, Sheep and Pigs | 936 18 0 | | | 768 0 0 |
| lxxxviii | Catalogues, &c. | 100 9 1 | | | 101 8 2 |
| | | | 1,613 8 7 | | 1,658 15 11 |
| lxxxviii | Poultry | | | | 74 3 7 |
| lxxxviii | Shoeing | | | | 57 10 0 |
| lxxxviii | Timbering and Splicing | | | | 22 2 6 |
| xc | Horticulture | | | | 146 10 6 |
| xc | Cheese and Butter | | 52 18 11 | | 65 15 8 |
| xc | Working Dairy | | 145 4 3 | | 147 9 6 |
| xcii | Cider | | 8 10 0 | | 12 15 0 |
| xcii | Admissions | | 2,290 13 3 | | 5,462 18 3 |
| xcii | Unapportionable :— | | | | |
| | Contract Premiums | 319 3 3 | | | 549 10 0 |
| | Sales and Fittings | 274 1 7 | | | 441 19 8 |
| | | | 593 4 10 | | 991 9 8 |
| xcii | Subscription from Worcester Local Committee | | 400 0 0 | | |
| | | | | 6,504 4 4 | 10,377 7 7 |
| | | | | 8,226 11 11 | 12,079 17 8 |
| xciv | Deposit returned | | | 1,500 0 0 | |
| xciv | Balance in Bank, January 1st | | | | 293 15 5 |
| xciv | Balance due to Bank, December 31st | | | 16 16 4 | 58 15 5 |
| | | | £ | 9,743 8 3 | 12,432 8 6 |

# Southern Counties Society.

## FOR THE YEAR ENDING DEC. 31ST, 1915.

STATEMENT FOR 1914.

Cr.

| Page of accompanying Cash Account. | PAYMENTS. | | 1915. Worcester. | | 1914. Swansea. |
|---|---|---|---|---|---|
| | | | £ s. d. | £ s. d. | £ s. d. |
| | **General :—** | | | | |
| lxxxvii | Salaries | | 1,100 0 0 | | 1,100 0 0 |
| lxxxvii | Miscellaneous | | 347 9 11 | | 242 15 1 |
| lxxxvii | Journal | | 413 10 0 | | 424 17 1 |
| | | | | 1,860 19 11 | 1,767 12 2 |
| | **Show :—** | | | | |
| lxxxvii | Implements | | 559 7 11 | | 592 5 2 |
| | | £ s. d. | | | |
| lxxxix | Horses | 1,235 7 11 | | | 1,127 2 6 |
| lxxxix | Cattle, Sheep, and Pigs | 2,301 2 5 | | | 2,400 18 8 |
| lxxxix | Fodder, &c. | 487 0 2 | | | 428 2 9 |
| | | | 4,023 10 6 | | 3,956 3 11 |
| lxxxix | Poultry | | | | 258 4 1 |
| lxxxix | Shoeing | | | | 175 1 3 |
| lxxxix | Timbering and Splicing | | | | 35 11 6 |
| lxxxix | Nature Study | | | | 56 4 10 |
| xci | Forestry | | 5 10 0 | | 92 2 3 |
| xci | Music | | 149 12 5 | | 181 18 7 |
| xci | Horticulture | | 159 9 11 | | 360 2 6 |
| xci | Bees | | 2 12 6 | | 10 0 0 |
| cxi | Cheese and Butter | | 184 7 5 | | 208 10 6 |
| xci | Working Dairy | | 446 6 6 | | 540 1 10 |
| xciii | Cider | | 88 8 6 | | 116 2 4 |
| xciii | Public Announcements | | 427 17 8 | | 430 16 10 |
| xciii | Unapportionable :— | | | | |
| | Erection of Offices, &c. | 1,112 0 10 | | | 1,242 4 8 |
| | Stand Fittings | 135 9 0 | | | 157 9 4 |
| | Police | 127 19 5 | | | 121 7 6 |
| | Miscellaneous | 301 0 4 | | | 439 18 0 |
| | Carriage of Plant | | | | 90 11 3 |
| | | | 1,676 9 7 | | 2,051 10 9 |
| | | | | 7,723 12 11 | 9,064 16 4 |
| xcv | **Experiments :—** | | | 100 0 0 | 100 0 0 |
| | | | | 9,684 12 10 | 10.932 8 6 |
| xcv | **Investments and Deposit** | | | | 1,500 0 0 |
| xcv | Balance due to Bank, Jan. 1st | | | 58 15 5 | |
| | | | £ | 9.743 8 8 | 12,432 8 6 |

*January* 15*th*, 1916.
Audited and found correct,
F. CLIFFORD GOODMAN, F.C.A.,
*Auditor.*

Passed by Council,
*January* 25*th*, 1916.
THOS. F. PLOWMAN,
*Secretary.*

# The Bath and West and

**Dr.** CASH ACCOUNT FOR THE YEAR ENDING DEC. 31st,

| RECEIPTS. | 1915. Worcester. | | 1914. Swansea. |
|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. |
| DIVIDENDS AND INTEREST :— | | | |
| Consols | 129 6 2 | | 137 1 3 |
| War Loan Stock | 74 9 8 | | |
| New Zealand Stock | 48 11 10 | | 51 8 11 |
| India Stock | 200 4 10 | | 212 5 2 |
| Queensland Stock | 97 8 11 | | 103 3 6 |
| New South Wales Stock | 62 1 3 | | 65 14 4 |
| Canadian Pacific Stock | 53 5 0 | | 56 5 0 |
| South Australian Stock | 36 14 0 | | |
| Interest on Deposit | 19 8 11 | | 29 19 11 |
| | | 721 10 7 | 655 18 1 |
| GENERAL RECEIPTS :— | | | |
| Sale of Waste Paper, &c. | | 0 10 9 | 0 8 7 |
| SUBSCRIPTIONS FROM MEMBERS :— | | | |
| Arrears | 30 18 0 | | 27 13 0 |
| Governors | 160 11 0 | | 167 15 0 |
| Subscribers of £1 and upwards | 748 9 0 | | 781 14 0 |
| Ditto of 10s. | 7 0 0 | | 7 0 0 |
| | | 946 18 0 | 984 2 0 |
| LIFE COMPOSITIONS | | 20 0 0 | 20 0 0 |
| JOURNAL :— | | | |
| Sales | 3 14 7 | | 6 17 10 |
| Advertisements | 29 13 8 | | 35 3 7 |
| | | 33 8 3 | 42 1 5 |
| IMPLEMENTS :— | | | |
| Fees for Space :— | | | |
| Machinery-in-Motion Shedding | 394 10 0 | | 482 5 0 |
| Ordinary ,, | 229 10 0 | | 269 5 0 |
| Miscellaneous ,, | 109 5 0 | | 136 15 0 |
| Boarded ,, | 367 2 6 | | 378 15 0 |
| Seed ,, | 19 0 0 | | 81 10 0 |
| Uncovered Ground | 161 3 0 | | 284 12 0 |
| Catalogue Fees | 68 15 6 | | 86 15 0 |
| Entry Fees | 50 18 6 | | 68 0 0 |
| | | 1,400 4 6 | 1,787 17 0 |
| Carried forward | £ | 3,122 12 1 | |

# Southern Counties Society

## 1915, WITH COMPARATIVE STATEMENT FOR 1914. Cr.

| PAYMENTS. | 1915. Worcester. | | | | | | 1914. Swansea. | | |
|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| SALARIES :— | | | | | | | | | |
| Secretary (including Clerks, Show Expenses, &c.) | 1,050 | 0 | 0 | | | | 1,050 | 0 | 0 |
| Auditor | 20 | 0 | 0 | | | | 20 | 0 | 0 |
| Consulting Chemist | 30 | 0 | 0 | | | | 30 | 0 | 0 |
| | | | | 1,100 | 0 | 0 | 1,100 | 0 | 0 |
| MISCELLANEOUS :— | | | | | | | | | |
| Printing | 15 | 9 | 5 | | | | 13 | 1 | 4 |
| Stationery and Finance Books | 28 | 19 | 4 | | | | 33 | 11 | 2 |
| Postages, Telegrams, Cheque and Receipt Stamps | 56 | 15 | 6 | | | | 69 | 16 | 10 |
| Ground Rent and Rates | 22 | 14 | 2 | | | | 21 | 17 | 1 |
| Income and Property Tax | 3 | 2 | 5 | | | | 2 | 3 | 9 |
| Travelling Expenses | 24 | 0 | 2 | | | | 32 | 2 | 0 |
| Carriage of Goods | 11 | 13 | 4 | | | | 13 | 13 | 5 |
| Directories and Reference Books | 2 | 2 | 7 | | | | 2 | 7 | 4 |
| Subscriptions and Grant | 7 | 12 | 0 | | | | 11 | 11 | 0 |
| Repairs and Fittings | 5 | 17 | 6 | | | | 5 | 6 | 1 |
| Hire of London Rooms for Meetings | 3 | 3 | 0 | | | | 3 | 3 | 0 |
| Fuel and Light | 6 | 16 | 1 | | | | 3 | 16 | 1 |
| Finance Committee's Expenses | 11 | 1 | 10 | | | | | | |
| Telephone | 7 | 16 | 0 | | | | 6 | 6 | 0 |
| Bank Charges for Conversion of Consols | 39 | 0 | 0 | | | | | | |
| Miscellaneous | 1 | 6 | 7 | | | | | | |
| Relief to Allies Fund | 100 | 0 | 0 | | | | | | |
| Lawes Agricultural Trust | | | | | | | 21 | 0 | 0 |
| | | | | 347 | 9 | 11 | 242 | 15 | 1 |
| JOURNAL :— | | | | | | | | | |
| Editor | 100 | 0 | 0 | | | | 100 | 0 | 0 |
| Associate Editor | 100 | 0 | 0 | | | | 100 | 0 | 0 |
| Printing and Binding | 140 | 8 | 10 | | | | 152 | 6 | 0 |
| Plans and Blocks | 14 | 3 | 10 | | | | 15 | 17 | 6 |
| Journal Distribution | 17 | 12 | 8 | | | | 18 | 12 | 1 |
| Postages, Stationery, Reference Books, &c. | 4 | 10 | 8 | | | | 4 | 0 | 6 |
| Payments to Authors | 36 | 14 | 0 | | | | 34 | 1 | 0 |
| | | | | 413 | 10 | 0 | 424 | 17 | 1 |
| IMPLEMENTS :— | | | | | | | | | |
| Shedding | 486 | 4 | 3 | | | | 501 | 10 | 6 |
| Stewards and Assistants | 48 | 0 | 10 | | | | 54 | 19 | 7 |
| Printing, Stationery, &c. | 20 | 16 | 4 | | | | 24 | 0 | 7 |
| Fees returned | 4 | 6 | 6 | | | | 11 | 14 | 6 |
| | | | | 559 | 7 | 11 | 592 | 5 | 2 |
| Carried forward | | | £ | 2,420 | 7 | 10 | | | |

## DR. CASH ACCOUNT—*continued.*

| RECEIPTS. | | | | 1915. Worcester. | | | | | | 1914. Swansea. | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| Brought forward . | | | | | | | 3,122 | 12 | 1 | | | |
| HORSES, CATTLE, SHEEP AND PIGS :— | | | | | | | | | | | | |
| Horses :—Entry Fees . . | 266 | 7 | 6 | | | | | | | 232 | 15 | 0 |
| Fines . . | 4 | 10 | 0 | | | | | | | 2 | 10 | 0 |
| Grand Stand Admissions | 226 | 4 | 0 | | | | | | | 356 | 9 | 3 |
| Special Prizes . | 79 | 0 | 0 | | | | | | | 197 | 13 | 6 |
| | | | | 576 | 1 | 6 | | | | 789 | 7 | 9 |
| Cattle, Sheep and Pigs :— | | | | | | | | | | | | |
| Entry Fees . . | 467 | 18 | 0 | | | | | | | 459 | 10 | 0 |
| Fines . . . | 31 | 0 | 0 | | | | | | | 26 | 10 | 0 |
| Special Prizes . | 438 | 0 | 0 | | | | | | | 282 | 0 | 0 |
| | | | | 936 | 18 | 0 | | | | 768 | 0 | 0 |
| Catalogues, Manure and Fodder . . | | | | 100 | 9 | 1 | | | | 101 | 8 | 2 |
| | | | | | | | 1,613 | 8 | 7 | 1,658 | 15 | 11 |
| POULTRY . . . . . . . . . | | | | | | | | | | 74 | 3 | 7 |
| SHOEING . . . . . . . . . | | | | | | | | | | 57 | 10 | 0 |
| TIMBERING AND SPLICING . . . | | | | | | | | | | 22 | 2 | 6 |
| Carried forward . | | | | | | | £ 4,736 | 0 | 8 | | | |

## CASH ACCOUNT—*continued.* CR.

| PAYMENTS. | | 1915. WORCESTER. | | 1914. SWANSEA. |
|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Brought forward . | | | 2,420 7 10 | |
| HORSES, CATTLE, SHEEP AND PIGS :— | | | | |
| Horses—Prizes . . | 731 0 0 | | | 800 13 6 |
| Shedding & Grand Stand | 422 16 6 | | | 214 14 8 |
| Stewards and Assistants | 61 5 1 | | | 60 6 2 |
| Judges . . . | 18 6 4 | | | 50 3 2 |
| Fees returned . . | 2 0 0 | | | 1 5 0 |
| | | 1,235 7 11 | | 1,127 2 6 |
| Cattle—Prizes £1,028 0 0 | | | | 1,085 4 7 |
| Less deferred 7 0 0 | | | | 5 0 0 |
| | 1,021 0 0 | | | 1,080 4 7 |
| Sheep—Prizes . . . | 552 0 0 | | | 492 1 0 |
| Pigs—Prizes . . . | 187 0 0 | | | 183 3 0 |
| Shedding and Canvas | 389 12 1 | | | 419 19 5 |
| Stewards and Assistants | 43 0 9 | | | 44 7 1 |
| Judges . . . | 102 4 7 | | | 177 3 7 |
| Fees Returned . | 2 10 0 | | | 4 0 0 |
| Stock Judging Prizes | 3 15 0 | | | |
| | | 2,301 2 5 | | 2,400 18 8 |
| Buildings, etc. . . . | 239 3 3 | | | 98 14 10 |
| Fodder and Insurance . | 174 0 6 | | | 203 9 0 |
| Fodder Assistants . . | 8 6 7 | | | 8 9 4 |
| Veterinary Inspector . | 5 5 0 | | | 32 5 6 |
| Rosettes . . . . . | 11 17 1 | | | 13 10 2 |
| Printing and Stationery . | 38 14 7 | | | 49 4 0 |
| Refreshments to Judges . | 9 13 2 | | | 14 3 3 |
| Prize Cheques . . . | | | | 8 6 8 |
| | | 487 0 2 | | 428 2 9 |
| | | | 4,023 10 6 | 3,956 3 11 |
| POULTRY . . . . . . . . . | | | | 258 4 1 |
| SHOEING . . . . . . . . . | | | | 175 1 3 |
| TIMBERING AND SPLICING . . . . | | | | 35 11 6 |
| NATURE STUDY . . . . . . . . | | | | 56 4 10 |
| Carried forward . | | | £ 6,443 18 4 | |

## Dr. CASH ACCOUNT—*continued.*

| RECEIPTS. | | 1915. WORCESTER. | | 1914. SWANSEA. |
|---|---|---|---|---|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Brought forward . | | | 4,736 0 8 | |
| **HORTICULTURE:—** | | | | 146 10 6 |
| **CHEESE AND BUTTER:—** | | | | |
| Entry Fees . . . . . . . | | 37 5 0 | | 40 15 0 |
| Sales . . . . . . . | | 15 8 11 | | 14 5 8 |
| Special Prizes and Fines . . . . | | 0 5 0 | | 10 15 0 |
| | | | 52 18 11 | 65 15 8 |
| **WORKING DAIRY:—** | | | | |
| Admissions . . . . . . | | 2 5 3 | | 11 3 0 |
| Entry Fees, Competitions . | 42 10 0 | | | 43 17 6 |
| „ Appliances . . | 5 5 0 | | | 9 9 0 |
| „ Tests . . . | 9 0 0 | | | 23 0 0 |
| | | 56 15 0 | | 76 6 6 |
| Sale Premium . . . . . . . . | | 20 0 0 | | 35 0 0 |
| Special Prizes . . . . . . . . | | 65 0 0 | | 25 0 0 |
| Salt sold . . . . . . . . | | 1 4 0 | | |
| | | | 145 4 3 | 147 9 6 |
| Carried forward . | | £ | 4,934 3 10 | |

## CASH ACCOUNT—*continued*. Cr.

| PAYMENTS. | 1915. Worcester. £ s. d. | 1915. Worcester. £ s. d. | 1914. Swansea. £ s. d. |
|---|---|---|---|
| Brought forward | | 6,443 18 4 | |
| FORESTRY:— | | | |
| Steward and Assistants | 0 10 0 | | 6 0 0 |
| Judge and Demonstrator | 5 0 0 | | 9 7 0 |
| Labour and Fittings | | | 68 6 3 |
| Printing, Postage, &c. | | | 1 11 6 |
| Prizes | | | 6 17 6 |
| | | 5 10 0 | 92 2 3 |
| MUSIC:— | | | |
| Bands and their Fares | 114 11 6 | | 170 0 0 |
| Steward and Assistants | 6 10 11 | | 6 4 7 |
| Erecting Band Stand and Seats | 28 10 0 | | 5 14 0 |
| | | 149 12 5 | 181 18 7 |
| HORTICULTURE:— | | | |
| Gratuities to Gardeners | 100 0 0 | | 167 0 0 |
| Erecting and Repairing Tent and Staging | 39 12 2 | | 160 18 7 |
| Steward and Assistants, Printing, &c. | 10 17 9 | | 32 3 11 |
| | | 159 9 11 | 360 2 6 |
| BEES:— | | | |
| Beekeepers' Association | | 2 12 6 | 10 0 0 |
| CHEESE AND BUTTER:— | | | |
| Judges | 8 8 4 | | 12 10 6 |
| Prizes | 122 0 0 | | 143 10 0 |
| Steward and Assistants | 8 10 0 | | 9 18 6 |
| Shedding and Grass Table for Butter Exhibits | 39 14 10 | | 40 3 9 |
| Printing, Stationery, Carriage, &c. | 5 14 3 | | 2 7 9 |
| | | 184 7 5 | 208 10 6 |
| WORKING DAIRY:— | | | |
| Stewards and Assistants | 27 0 1 | | 52 7 6 |
| Judges and Demonstrators | 66 3 4 | | 98 0 2 |
| Buildings | 203 9 0 | | 258 7 5 |
| Printing, Stationery, Postages and Insurance | 4 8 2 | | 6 14 8 |
| Utensils, Carriage, Cows for Milking, &c. | 38 7 9 | | 40 1 7 |
| Prizes | 85 0 0 | | 66 0 6 |
| Coal, Salt, Ice, &c. | 12 17 7 | | 5 8 11 |
| Consulting Chemist for Analyses, &c. | 8 0 7 | | 13 1 1 |
| Fees Returned | 1 0 0 | | |
| | | 446 6 6 | 549 1 10 |
| Carried forward | | £ 7,391 17 1 | |

**Dr.**

## CASH ACCOUNT—*continued.*

| RECEIPTS. | 1915. Worcester. | | | | | | 1914 Swansea. | | |
|---|---|---|---|---|---|---|---|---|---|
| | £ | *s.* | *d.* | £ | *s.* | *d.* | £ | *s.* | *d.* |
| Brought forward | | | | 4,934 | 3 | 10 | | | |
| CIDER:— | | | | | | | | | |
| Entry Fees | 8 | 5 | 0 | | | | 12 | 15 | 0 |
| Fine | 0 | 5 | 0 | | | | | | |
| | | | | 8 | 10 | 0 | 12 | 15 | 0 |
| ADMISSIONS TO SHOW-YARD:— | | | | | | | | | |
| Admissions at 2*s.* 6*d.* | 889 | 12 | 6 | | | | 2,017 | 15 | 0 |
| „ „ 1*s.* | 1,277 | 4 | 0 | | | | 3,142 | 17 | 0 |
| „ „ 6*d.* and 3*d.* | 73 | 19 | 0 | | | | 158 | 10 | 0 |
| Season Tickets, etc. | 49 | 17 | 9 | | | | 143 | 16 | 3 |
| | | | | 2,290 | 13 | 3 | 5,462 | 18 | 3 |
| SHOW (UNAPPORTIONABLE):— | | | | | | | | | |
| Sales, Fittings, etc. | 274 | 1 | 7 | | | | 441 | 19 | 8 |
| Contract Premiums | 319 | 3 | 3 | | | | 549 | 10 | 0 |
| | | | | 593 | 4 | 10 | 991 | 9 | 8 |
| SUBSCRIPTIONS FROM TOWNS:— | | | | | | | | | |
| Worcester, for 1915 Show | | | | 400 | 0 | 0 | | | |
| Carried forward | | | £ | 8,226 | 11 | 11 | | | |

## CASH ACCOUNT—*continued.* Cr.

| PAYMENTS. | 1915. Worcester. | | | | | | 1914. Swansea. | | |
|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| Brought forward | | | | 7,391 | 17 | 1 | | | |
| CIDER:— | | | | | | | | | |
| Shedding and Fittings | 24 | 5 | 5 | | | | 35 | 14 | 0 |
| Steward and Assistants | 14 | 5 | 0 | | | | 22 | 8 | 11 |
| Judge | 3 | 17 | 2 | | | | 5 | 18 | 11 |
| Prizes | 26 | 17 | 0 | | | | 30 | 10 | 0 |
| Analyses, Carriage, Printing, &c. | 19 | 3 | 11 | | | | 21 | 10 | 6 |
| | | | | 88 | 8 | 6 | 116 | 2 | 4 |
| PUBLIC ANNOUNCEMENTS:— | | | | | | | | | |
| Advertising | 182 | 14 | 3 | | | | 170 | 12 | 8 |
| Billposting | 141 | 17 | 5 | | | | 144 | 0 | 0 |
| Railway Placards | 62 | 15 | 0 | | | | 69 | 15 | 0 |
| Printing | 40 | 11 | 0 | | | | 46 | 9 | 2 |
| | | | | 427 | 17 | 8 | 430 | 16 | 10 |
| SHOW (UNAPPORTIONABLE):— | | | | | | | | | |
| Official Buildings, &c. | 1,083 | 12 | 1 | | | | 1,117 | 14 | 10 |
| Hoarding | 28 | 8 | 9 | | | | 124 | 9 | 10 |
| Carriage of Plant | | | | | | | 90 | 11 | 3 |
| Works Assistant | 5 | 14 | 6 | | | | 6 | 3 | 4 |
| Stand Fittings | 135 | 9 | 0 | | | | 157 | 9 | 4 |
| Insurance | 22 | 0 | 4 | | | | 20 | 0 | 8 |
| Furnishing Official Buildings | 25 | 3 | 6 | | | | 31 | 2 | 8 |
| Mess Room, Allotment Expenses, &c. | 10 | 7 | 1 | | | | 15 | 13 | 8 |
| Gatekeepers, Yardmen, Messengers, &c. | 94 | 16 | 0 | | | | 105 | 13 | 10 |
| Stewards of Finance and Treasurer | 14 | 13 | 4 | | | | 32 | 2 | 6 |
| Finance Office and Treasurer's Clerks | 47 | 9 | 4 | | | | 48 | 2 | 2 |
| Police | 127 | 19 | 5 | | | | 121 | 7 | 6 |
| Badges, &c. | 3 | 8 | 10 | | | | 4 | 10 | 5 |
| Catalogues for Press and Officials | 5 | 8 | 6 | | | | 3 | 1 | 0 |
| Purchase of Plant | 9 | 17 | 11 | | | | 60 | 4 | 2 |
| Printing, Stationery, Commission on Season Tickets, &c. | 36 | 16 | 0 | | | | 39 | 1 | 2 |
| Extension of Telegraph Wires | 25 | 5 | 0 | | | | 13 | 5 | 0 |
| Telephone Office | | | | | | | 10 | 17 | 5 |
| Swansea Hospital | | | | | | | 50 | 0 | 0 |
| | | | | 1,676 | 9 | 7 | 2,051 | 10 | 9 |
| Carried forward | | | £ | 9,584 | 12 | 10 | | | |

## Dr. CASH ACCOUNT—*continued.*

| RECEIPTS. | | | | 1915. WORCESTER. | | | 1914. SWANSEA. | | |
|---|---|---|---|---|---|---|---|---|---|
| | £ | s. | d. | £ | s. | d. | £ | s. | d. |
| Brought forward . | | | | 8,226 | 11 | 11 | | | |
| | | | | 8,226 | 11 | 11 | 12,079 | 17 | 8 |
| DEPOSIT RETURNED . . . . . | | | | 1,500 | 0 | 0 | | | |
| Balance in Bank, Jan. 1st . . | | | | | | | 293 | 15 | 5 |
| Balance due to Bank, Dec. 31st . . | | | | 16 | 16 | 4 | 58 | 15 | 5 |
| | | | £ | 9,743 | 8 | 3 | 12,432 | 8 | 6 |

## CASH ACCOUNT—*continued*. Cr.

| PAYMENTS. | 1915. WORCESTER. £ s. d. | £ s. d. | 1914. SWANSEA. £ s. d. |
|---|---|---|---|
| Brought forward . | | 9,584 12 10 | |
| EXPERIMENTS :— | | | |
| CIDER INSTITUTE . . . . . | | 100 0 0 | 100 0 0 |
| | | 9,684 12 10 | 10,932 8 6 |
| INVESTMENTS AND DEPOSIT . . . | | | 1,500 0 0 |
| Balance due to Bank, Jan. 1st . | | 58 15 5 | |
| | £ | 9,743 8 3 | 12,432 8 6 |

*Jan.* 15*th*, 1916.

I hereby certify that I have examined the foregoing accounts for the year ending December 31st, 1915, compared the payments entered with the vouchers, and found them all in order and correct.

F. CLIFFORD GOODMAN, F.C.A.,
*Auditor.*

Passed by Council,
*Jan.* 25*th*, 1916,
THOS. F. PLOWMAN,
*Secretary.*

## ASSETS AND LIABILITIES ACCOUNT TO DECEMBER 31st, 1915, WITH COMPARISON FOR 1914.

| ASSETS. | | 1915 Worcester £ s. d. | 1914 Swansea £ s. d. |
|---|---|---|---|
| INVESTMENTS | | 16,804 6 11 | 17,559 10 2 |

| | Par. Value. £ s. d. | Actual Cost £ s d. | * Market Value on Dec. 31. £ s. d. |
|---|---|---|---|
| New Zealand Stock | 1,568 1 6 | 1,500 0 0 | 1,305 8 5 |
| †Consols, converted into 4½% War Loan Stock | 3,894 11 11 | 5,809 19 6 | 3,782 12 6 |
| India „ | 7,538 15 1 | 7,277 5 1 | 5,220 11 9 |
| Queensland „ | 2,751 9 0 | 3,000 0 0 | 2,613 17 6 |
| N. S. Wales „ | 1,752 8 10 | 2,000 0 0 | 1,664 16 5 |
| Canadian Pacific Rly. | 1,500 0 0 | 1,576 2 6 | 1,263 15 0 |
| South Australian „ | 1,036 3 3 | 1,000 0 0 | 953 5 4 |
| | 20,041 9 7 | 22,163 7 1 | 16,804 6 11 |

| ASSETS. | | 1915 Worcester £ s. d. | 1914 Swansea £ s. d. |
|---|---|---|---|
| FUND FOR REPLACEMENT OF CAPITAL | | 12 8 3 | |
| CASH ON DEPOSIT | | | 1,500 0 0 |
| CONTRIBUTION FROM WORCESTER | | | 400 0 0 |
| PLANT :— Works | 206 5 4 | | 219 5 0 |
| Dairy | 16 19 7 | | 18 17 4 |
| | | 223 4 11 | 238 3 1 |
| HOUSE PROPERTY | 633 10 7 | | 633 10 7 |
| FURNITURE AND FITTINGS | 162 3 6 | | 166 6 8 |
| | | 795 14 1 | 799 17 3 |
| SUBSCRIPTION ARREARS | | 66 7 0 | 82 14 0 |
| | | 17,902 1 2 | 20,580 14 6 |
| | £ | 17,902 1 2 | 20,580 4 6 |

| LIABILITIES. | 1915. Worcester. £ s. d. | 1914. Swansea. £ s. d. |
|---|---|---|
| DEFERRED PRIZES | 7 0 0 | 22 0 0 |
| WORCESTER MEETING | | 400 0 0 |
| JOURNAL, cost of, estimated at | 450 0 0 | 450 0 0 |
| DUE TO FUND FOR REPLACEMENT OF CAPITAL | 12 8 3 | |
| DUE TO BANK | 16 16 4 | 58 15 5 |
| | 486 4 7 | 930 15 5 |
| BALANCE | 17,415 16 7 | 19,649 9 1 |
| £ | 17,902 1 2 | 20,580 4 6 |

* The prices quoted under the heading of Market Value, except in the case of the War Stock and Canadian Pacific Debenture Stock, are the official minima fixed by the Government and do not represent the real value of the Stock.

† Formerly £5,841 17s 11d Consols

January 15th, 1916.

I hereby certify that I have audited the above Balance Sheet, and that, in my opinion, it is correct, and shows the true position of the Society's affairs according to the Books. The securities for the Society's Investments have been produced to me, and I have found them in order. The various Stocks have been valued by the Society's Bankers

F. CLIFFORD GOODMAN, F.C.A., Auditor.

Passed by Council
January 25th, 1916.
THOS. F. PLOWMAN, Secretary.

# Bath and West and Southern Counties Society.

## STATEMENT SHOWING FINANCIAL RESULT OF THE WORCESTER (1915) SHOW.

| Printed Financial State-ments. | | | | |
|---|---|---|---|---|
| Page | | £ s. d. | £ s. d. | £ s. d. |
| lxxxv | Show Payments as per Summary . . . | | 7,723 12 11 | |
| xcvi | Deferred Prizes . . . . . . | | 7 0 0 | |
| | | | 7,730 12 11 | |
| xciii | Less Show Plant purchased . . | 9 17 11 | | |
| | Less 10 per cent. for depreciation . | 0 19 9 | | |
| | | | 8 18 2 | |
| | | | | 7,721 14 9 |
| lxxxiv | Show Receipts as per Summary . . . | | | 6,504 4 4 |
| | * Net loss . . . | | £ | 1,217 10 5 |

---

* The cost of the carriage of the Show Plant now at Worcester—say £90 additional—must be added to this amount.

# Bath and West and Southern Counties Society,

FOR THE

*Encouragement of Agriculture, Arts, Manufactures and Commerce.*

# List of Members, 1916.

### PATRON.

HIS MOST GRACIOUS MAJESTY THE KING.

### PRESIDENT

THE RIGHT HON. THE EARL OF COVENTRY.

### TRUSTEES.

THE MOST HON. THE MARQUIS OF BATH.
SIR C. T. D. ACLAND, BART.
C. L. F. EDWARDS, ESQ.

*Names thus (*) distinguished are Governors.*
*Names thus (†) distinguished are Life Members.*
⁂ *Members are particularly requested to make the Secretary acquainted with any errors in the names of residences.*

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| *†His Most Gracious Majesty the King | Windsor Castle | | .. | |
| Ackers, Chas. P. | Huntley Manor, Gloucester | 1 | 0 | 0 |
| Ackland, J. | Cutton Farm, Poltimore, Exeter | 1 | 0 | 0 |
| Acland, Alfred Dyke | . . . . . . . . | 1 | 0 | 0 |
| †Acland, Rt. Hon. A. H. Dyke | 29, St. James' Court, Buckingham Gate, London, S.W. | | ... | |
| *Acland, Sir C. T. D., Bart. | Killerton, Exeter | 5 | 0 | 0 |
| Acland, F. Dyke, M.P. | 5, Cheyne Place, London, S.W. | 1 | 0 | 0 |
| Adams, E. C. | Brentwood, Combe Down, Bath | 1 | 0 | 0 |
| Adams, G. & Son | Wadley House, Faringdon, Berks | 1 | 0 | 0 |
| Adams, R. and H. (Ltd.) | 10, Queen Square, Bristol | 1 | 0 | 0 |
| Adeane, C. R. W. | Babraham, Cambridge | 1 | 0 | 0 |
| †Aitken, G. H. | Longleat Estate Office, Warminster | | .. | |
| Akers, E. | St. Fagans, Cardiff | 1 | 0 | 0 |
| Alexander, D. | Cardiff | 1 | 1 | 0 |
| Alexander, H. G. | Dinas Powis, Cardiff | 1 | 1 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Allen & Sons | Cheese Merchants, Shepton Mallet. | 1 | 1 | 0 |
| †Allen, James D. | Springfield House, Shepton Mallet | | .. | |
| Allen, W. T. | West Bradley, Glastonbury | 1 | 0 | 0 |
| Allin, Mrs. N. | Townsend Manor Farm, Over Wallop, Stockbridge | 1 | 0 | 0 |
| Allix, C. I. L. | St. Germans, Cornwall | 1 | 0 | 0 |
| Allsebrook, A. | Link Elm, Malvern Link | 1 | 1 | 0 |
| Ames, F. | Hawford Lodge, Worcester | 1 | 0 | 0 |
| Andrews, S. Fox- | Union Street, Bath | 1 | 0 | 0 |
| Anglo-Continental Guano Works | Dock House, Billiter Street, E.C. | 1 | 0 | 0 |
| Anglo-Swiss Condensed Milk Company | Chippenham | 1 | 0 | 0 |
| Arnott, G. C. | 69, Fenchurch Street, London, E.C. | 1 | 0 | 0 |
| †Ashcomb, Lord | Denbies, Dorking | | .. | |
| †Ashcroft, W. | 13, The Waldrons, Croydon | | .. | |
| Ashford, E. C., M.D. | The Moorlands, Bath | 1 | 0 | 0 |
| *Astor, Waldorf | Cliveden, Taplow, Bucks | 2 | 0 | 0 |
| Augustein, J. R. | Holbrook House, Wincanton | 1 | 0 | 0 |
| Aungier, J. | Lynwick, Rudgwick | 1 | 0 | 0 |
| †Avebury, Lord | High Elms, Hayes, Kent | | .. | |
| †Aveling, Thomas L. | Rochester | | .. | |
| Avon Manure Company (Ld.) | St. Philip's Marsh, Bristol | 1 | 0 | 0 |
| Badcock, H. Jefferies | Broadlands, Taunton | 1 | 0 | 0 |
| Bainbridge, Mrs. R. C. | Elfordleigh, Plympton, South Devon | 1 | 0 | 0 |
| Baker, G. E. Lloyd | Hardwicke Court, Gloucester | 1 | 0 | 0 |
| †Baker, M. G. Lloyd | The Cottage, Hardwicke, Glos. | | .. | |
| †Baker, L. J. | 10, Ennismore Gardens, London, S.W. | | .. | |
| Balston, R. J. | Bilsington Priory, Ashford, Kent | 1 | 0 | 0 |
| *Balston, W. E. | Barvin, Potters Bar, Herts | 2 | 0 | 0 |
| Bamfords (Ltd.) | Uttoxeter | 1 | 0 | 0 |
| Barford and Perkins (Ltd.) | Peterborough | 1 | 0 | 0 |
| Barham, G. T. | Sudbury Park, Wembley, Middlesex | 1 | 0 | 0 |
| Baring, Hon. A. H. | The Grange, Alresford, Hants | 1 | 0 | 0 |
| *Barker-Hahlo, H. | Camerton Court, Bath | 2 | 0 | 0 |
| Barlow, Sir J. Emmott, Bart., M.P. | Torkington Lodge, Hazel Grove, near Stockport | 1 | 0 | 0 |
| Barrett, Col. W. | Moreden, Taunton | 1 | 0 | 0 |
| Barstow, J. J. J. | The Lodge, Weston-super-Mare | 1 | 1 | 0 |
| Barton, D. J. | . . . . . . . . . . | 0 | 10 | 0 |
| Bassett, A. F. | Tehidy, Camborne, Cornwall | 1 | 0 | 0 |
| Bates, W. J. & Co. | Victoria Iron Works, Denton, Manchester | 1 | 0 | 0 |

| **Name.** | **Residence.** | **Sub-scriptions.** | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| *†Bath, Marquis of | Longleat, Warminster | | .. | |
| Bath and Somersetshire Dairy Co. (Ltd.) | Bath | 1 | 0 | 0 |
| Bath and Wells, The Bishop of | The Palace, Wells | 1 | 1 | 0 |
| Bath Gas Company | Bath | 1 | 0 | 0 |
| †Bathurst, C., M.P. | Lydney Park, Glos. | | .. | |
| Batten, Col. Cary | Abbotsleigh, Bristol | 1 | 0 | 0 |
| Batten-Pooll, R. H. | Road Manor, Bath | 1 | 0 | 0 |
| †Baxendale, J. Noel | Froxfield Green, Petersfield | | .. | |
| Bayly, J. | Highlands, Ivybridge, S. Devon | 1 | 0 | 0 |
| Beauchamp, E. B. | Trevince, Redruth | 1 | 0 | 0 |
| Beauchamp, F. B. | Woodborough House, Peasedown St. John, Bath | 1 | 1 | 0 |
| *Beaufort, Duke of | Badminton, Chippenham | 2 | 2 | 0 |
| Beaufoy, M. H. | Coombe Priory, Shaftesbury | 1 | 0 | 0 |
| Bennett, Brothers | *Journal* Office, Salisbury | 1 | 1 | 0 |
| Bennett, R. A. | Thornbury, Glos. | 1 | 0 | 0 |
| Bennetts, J. M. | Killaganoon, St. Feock, Cornwall | 1 | 1 | 0 |
| Bentall, Edward H. & Co. | Heybridge, Maldon, Essex | 1 | 0 | 0 |
| Benyon, H. A. | Englefield House, Reading | 1 | 1 | 0 |
| *Benyon, J. Herbert | Englefield House, Reading | 5 | 0 | 0 |
| Beor, H. | Caswell, near Swansea. | 1 | 0 | 0 |
| Berryman, F. H. | Field House, Shepton Mallet | 1 | 1 | 0 |
| Best, Capt. T. G. | East Carleton Manor, Norwich | 1 | 0 | 0 |
| †Best, Capt. W. | Vivod, Llangollen, North Wales | | .. | |
| Best, Hon. Bertha | Charlton House, Ludwell, Salisbury | 1 | 0 | 0 |
| Best, Hon. J. W. | Charlton House, Ludwell, Salisbury | 1 | 0 | 0 |
| Beynon, J. W. | 16, Mount Stuart Square, Cardiff | 1 | 1 | 0 |
| Birmingham, C. | Nutscale, The Parks, Minehead | 0 | 10 | 0 |
| †Blackburn, H. P. | Donhead Hall, Salisbury | | .. | |
| Blackstone & Co. (Ltd.) | Rutland Iron Works, Stamford | 1 | 1 | 0 |
| Blake, Col. M. Lock | Bridge, S. Petherton | 1 | 0 | 0 |
| Blathwayt, R. W. | Dyrham Park, Chippenham | 1 | 1 | 0 |
| Board, R. J. | Skinner, Board & Co., Rupert St., Bristol | 1 | 0 | 0 |
| Bolden, Rev. C. | Preston Bissett, Buckingham | 1 | 0 | 0 |
| Bolitho, R. F. | Ponsandane, Penzance | 1 | 1 | 0 |
| Bolitho, T. B. | Trewidden, Penzance | 1 | 0 | 0 |
| Bolitho, T. R. | Trengwainton, Hea Moor, Cornwall | 1 | 1 | 0 |
| Bond, E. (W. Evans & Co.) | Hele, Cullompton | 1 | 0 | 0 |
| Boscawen, Rev. A. T. | Ludgvan Rectory, Long Rock, R.S.O., Cornwall | 1 | 0 | 0 |
| Boscawen, Townshend E. | 2, Old Burlington St., London, W. | 1 | 0 | 0 |
| Bourne, W. W. | Garston Manor, Watford, Herts | 1 | 0 | 0 |
| Bouverie, H. P. | Brymore, Bridgwater | 1 | 0 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| †Bowen-Jones, Sir J., Bart. | The Woodlands, Bicton, near Shrewsbury | | .. | |
| †Bowerman, Alfred | Hewelsfield Court, St. Briavels, Glos. | | .. | |
| Boyle, Capt. M. | The Manor, Steeple Fitzpaine, Taunton | 1 | 0 | 0 |
| Braby, F. & Co. | Ashton Gate Works, Bristol | 1 | 0 | 0 |
| Bradford, Thomas & Co. | Salford, Manchester | 1 | 0 | 0 |
| Brand, Admiral Hon. T. S. | Glynde, Lewes, Sussex | 1 | 0 | 0 |
| †Brassey, A. | Heythrop, Chipping Norton | | .. | |
| *†Brassey, H. L. C. | Apethorpe Hall, Wansford, Northants | | .. | |
| Bridges, J. H. | Ewell Court, near Epsom | 1 | 1 | 0 |
| †Brinkley, Rev. W. F. B. | The Vicarage, Abbots Leigh, Bristol | | .. | |
| *Bristol Times and Mirror*, Proprietors of | Bristol | 1 | 0 | 0 |
| Bristol Wagon and Carriage Works Co. (Ltd.) | Lawrence Hill, Bristol | 1 | 1 | 0 |
| Britten, Forester | Kenswick Manor, Worcester | 1 | 0 | 0 |
| †Broadmead, W. B. | Enmore Park, Bridgwater | | .. | |
| †Brocklehurst, H. D. | Sudeley Castle, Winchcombe | | .. | |
| Brockman, F. D. | Beach Borough, Hythe, Kent | 1 | 0 | 0 |
| Broderip, E. | Cossington, Somerset | 1 | 0 | 0 |
| Brown, F. E. | 1,403 Neath Road, Swansea | 1 | 0 | 0 |
| Browning, Albert, M.A. | The Homestead, Combe Park, Bath | 1 | 1 | 0 |
| Bruford, R. | Nerrols, Taunton | 1 | 0 | 0 |
| †Buckingham, Rev. Preb. | The Rectory, Doddiscombsleigh, Exeter, Devon | | .. | |
| Buck, D. | White House, Little Mill, Pontypool | 1 | 0 | 0 |
| Buckley, W. | Moundsmere Manor, Basingstoke | 1 | 0 | 0 |
| Budd, Felix S. | Clarendon House, Stow Park, Newport, Mon. | 1 | 0 | 0 |
| Budd, J. E. | Tidebrook Manor, Wadhurst, Sussex | 1 | 0 | 0 |
| Burghclere, Lord | 48, Charles Street, London, W. | 1 | 0 | 0 |
| Burnard, R. | Cattedown, Plymouth | 1 | 0 | 0 |
| Burrell, C. and Sons | St. Nicholas Works, Thetford | 1 | 0 | 0 |
| Burrell, Sir M. R., Bart. | Knepp Castle, Horsham, Sussex | 1 | 0 | 0 |
| †Bush, H. G. | Old Manor House, Keynsham | | .. | |
| Bush, Mrs. L. E. | St. Mary's, Atlantic Road South, Weston-s-Mare | 1 | 1 | 0 |
| Busk, H. G. | Bransford, Worcester | 1 | 1 | 0 |
| Buswell, C. and W. | Torquay | 1 | 0 | 0 |
| *Bute, The Marquis of | The Castle, Cardiff | 2 | 0 | 0 |
| Butland, B. | Leigham, Plympton | 1 | 0 | 0 |
| Butler, I. | Panteg House, near Newport, Mon. | 1 | 0 | 0 |
| Butterworth, R. W. | 21, St. James's Square, Bath | 1 | 0 | 0 |
| Byng, Col. Hon. C. | 70, Ashley Gardens, London, S.W. | 1 | 1 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Cæsar, H. and J. | Knutsford, Cheshire | 1 | 0 | 0 |
| Calthrop, F. C. | 56, Naylor Street, Liverpool | 1 | 0 | 0 |
| Campbell, J. | 93, Mansel Street, Swansea | 1 | 0 | 0 |
| Candy, T. C. | Woolcombe, Cattistock, Dorset | 1 | 0 | 0 |
| Carew, C. | Collipriest, Tiverton | 1 | 0 | 0 |
| Carnarvon, Earl of | Highclere Castle, Newbury | 1 | 1 | 0 |
| *Carr, Jonathan | Wood House, Twerton-on-Avon, Bath | 2 | 2 | 0 |
| †Carruthers W., F.R.S | 14, Vermont Road, Norwood, London, S.E. | | .. | |
| Carson, J. | Crystalbrook, Theydon Bois, Essex | 1 | 0 | 0 |
| †Carter, E. | East Upton, Ryde, Isle of Wight | | .. | |
| Carter, G. V. | Waterston Manor, Dorchester | 1 | 1 | 0 |
| Carter, J. & Co. | 238, High Holborn, London | 1 | 0 | 0 |
| Cartwright, T. G. | 30, Beaufort Gardens, London, S.W. | 1 | 0 | 0 |
| Carver, H. R. | West House, Chilton Polden, Bridgwater | 1 | 0 | 0 |
| Cary, Edmund | Pylle, Shepton Mallet | 0 | 10 | 0 |
| †Cary, John | The Priory, Shepton Mallet | | .. | |
| †Cary, W. H. | Mantua, Steeple Ashton, Trowbridge | | .. | |
| Cattybrook Brick Co. (Ltd.) | Baldwin Street, Bristol | 1 | 0 | 0 |
| Cave, Sir C., Bart. | Lidbury Manor, Sidmouth | 1 | 0 | 0 |
| Cave, C. H. | Rodway Hill House, Mangotsfield, Bristol | 1 | 0 | 0 |
| Cazalet, W. M. | Fairlawne, Tonbridge | 1 | 0 | 0 |
| Chapman, W. W. | Mowbray House, Norfolk Street, Strand, London, W.C. | 1 | 1 | 0 |
| Chester-Master, Major R. | St. Clair, The Park, Cheltenham | 1 | 0 | 0 |
| Chichester, Major C. H. | Hall, Bishops Tawton, Barnstaple | 1 | 0 | 0 |
| †Chick, J. H. | Wynford Eagle, Maiden Newton, Dorset | | .. | |
| †Chick, W. D. | Compton Valence, Dorchester | | .. | |
| Childs, C., M.D. | Boscarn, Looe, R.S.O., Cornwall | 1 | 0 | 0 |
| Christie, A. L. | Tapeley Park, Instow, N. Devon | 1 | 1 | 0 |
| Churchill, The Viscount, G.C.V.O. | Carlton Club, Pall Mall, London | 1 | 0 | 0 |
| †Churchward, F. | Hill House, Stoke Gabriel, near Totnes | | .. | |
| *Clarendon, Earl of | The Grove, Watford | 2 | 2 | 0 |
| Clark, H. A. | Hinton Field, Hinton Charterhouse, Bath | 1 | 0 | 0 |
| †Clark, J. J. | Goldstone Farm, Hove, Sussex (Hon. Local Sec., 1885) | | .. | |
| Clark, W. S. | Street, Glastonbury | 1 | 0 | 0 |
| Clark, W. H. | Rutland Cottage, Combe Down, Bath | 1 | 1 | 0 |
| Clarke, J. B. | Overleigh House, Street, Somerset | 1 | 0 | 0 |
| Clerk, Lieut.-Col. R. M. | Charlton House, Shepton Mallet | 1 | 0 | 0 |

| Name. | Residence. | £ | s. | d. |
|---|---|---|---|---|
| *Clifden, Viscount | Lanhydroc, Bodmin | 2 | 0 | 0 |
| *Clifford, Lord | Ugbrook, Chudleigh | 2 | 2 | 0 |
| Clinton, Lord | Heanton Satchville, Dolton, N. Devon | 1 | 0 | 0 |
| Clutton, R. W. | Hartswood, Reigate | 1 | 0 | 0 |
| Coaker, J. | Blagdon Barton, Paignton, Devon | 1 | 0 | 0 |
| Cobb, H. M. | Higham, Rochester | 1 | 0 | 0 |
| Cobb, R. | Larkin Hall, near Rochester | 1 | 0 | 0 |
| Coleridge, Hon. G. | Toddington, Winchcombe | 1 | 0 | 0 |
| Collins, J. S. | St. George's Lodge, Oldfield Park, Bath | 1 | 1 | 0 |
| Colman, Sir J., Bart. | Gatton Park, Surrey | 1 | 0 | 0 |
| Colmer, Jas. (Ltd.) | Union Street, Bath | 1 | 0 | 0 |
| *Colston, E. | Roundway Park, Devizes | 2 | 2 | 0 |
| Colthurst, Symons & Co. (Ltd.) | Bridgwater | 1 | 0 | 0 |
| Colville, H. K. | North Cerney House, Cirencester | 1 | 0 | 0 |
| Cook, R. | Widhayes, Tiverton | 1 | 0 | 0 |
| †Cookson, H. T. | Sturford Mead, Warminster |  | .. |  |
| Cooling, G. and Sons | Northgate Street, Bath | 1 | 1 | 0 |
| Cooper, Sir G., Bart. | Hureley Park, Winchester | 1 | 0 | 0 |
| Cope, W. | Southerndown, Glam. | 1 | 1 | 0 |
| Corbet, E. W. M. | Bute Estate Office, Cardiff | 1 | 1 | 0 |
| Corbett, Thomas | Perseverance Iron Works, Shrewsbury | 1 | 0 | 0 |
| Corker & Bevan | Swansea | 1 | 1 | 0 |
| †Cork and Orrery, The Earl of | 22, Ryder Street, London, S.W. |  | .. |  |
| †Corner, H. W. | Manor House, Inglescombe, Bath |  | .. |  |
| †Cornwallis, F. S. W. | Linton Park, Maidstone |  | .. |  |
| Cory, Sir Clifford | Llantarnam Abbey, Mon. | 1 | 0 | 0 |
| Cottam, H. C. D. | The Old Rectory, Wilton, near Salisbury | 1 | 0 | 0 |
| †Cotterell, Sir J. R. G., Bart. | Garnons, Hereford |  | .. |  |
| Coultas, J. R. | Allington, near Grantham | 1 | 0 | 0 |
| †Courage, Raymond | Shenfield Place, Brentwood, Essex |  | .. |  |
| †Coussmaker, Lt.-Col. G. | Westwood, Normandy, Guildford, Surrey |  | .. |  |
| *Coventry, The Earl of | Croome Court, Worcester | 2 | 0 | 0 |
| Cox, B. | Pwlpen Farm, Christchurch, Newport, Mon. | 0 | 10 | 0 |
| Cox & Sons | 47, City Road, Cardiff | 1 | 0 | 0 |
| Crewdson, J. D. | Syde, near Cheltenham | 1 | 0 | 0 |
| Crick, Thomas | Great Ash, Winsford, Dulverton | 0 | 10 | 0 |
| Cridlan, J. J. | Maisemore Park, Gloucester | 1 | 0 | 0 |
| Crutchley, P. E. | Limminghill Lodge, Ascot | 1 | 0 | 0 |
| Cuming, A. P. | Moreton Hampstead, Devon | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. £ | s. | d. |
|---|---|---|---|---|
| Cundall, H. M., I.S.O., F.S.A. | Richmond Hill, Surrey | 1 | 0 | 0 |
| †Curre, E. | Itton Court, Chepstow | | .. | |
| Currie, L. | Minley Manor, Farnborough, Hants | 1 | 0 | 0 |
| Currie, W. C. | Seacombe, Liverpool | 1 | 0 | 0 |
| Dairy Supply Company (Ltd.) | Museum St., Bloomsbury, London | 1 | 0 | 0 |
| †Daniel, H. T. | The Red House, Cannington, Bridgwater | | .. | |
| Daniel, Thos. C. | Stuckeridge, Bampton, North Devon | 1 | 1 | 0 |
| Darby, A. E. W. | Little Ness, Shrewsbury | 1 | 0 | 0 |
| Darby, E. | Liscombe, Dulverton | 1 | 0 | 0 |
| †Darell, D. | Hillfield House, Stoke Fleming, near Dartmouth | | .. | |
| †Davenport, Rev. Geo. H. | Foxley, Hereford | | .. | |
| †Davey, J. Sydney | Brockym, Cury - Cross - Lanes, Cornwall | | .. | |
| Davey, Sleep, & Co. (Ltd.) | Excelsior Plough Works, Plymouth | 1 | 0 | 0 |
| David & David | Old Bank Chambers, 27, High Street, Cardiff | 1 | 0 | 0 |
| Davies, D. | The Borough Stores, College Street, Swansea | 1 | 1 | 0 |
| Davis, Col. | Salt Hill House, near Slough | 1 | 0 | 0 |
| Davis, F. L. | 7, Bute Crescent, Cardiff | 1 | 1 | 0 |
| †Davis, H. J. | Sutton Montis, Sparkford, S.O., Somerset | | .. | |
| Davis & Co. | 75, George Street, Oxford | 1 | 0 | 0 |
| Daw, J. E. | Exeter | 1 | 1 | 0 |
| Dawson, W. and F. | Market Place, Bath | 1 | 0 | 0 |
| Day and Sons (Ltd.) | Crewe | 1 | 0 | 0 |
| †Deacon, W. S. | Poynters, Cobham, Surrey | | .. | |
| De Bertodano, B. | Cowbridge House, Malmesbury | 1 | 0 | 0 |
| De Blaquiere, Lord | 3, The Circus, Bath | 1 | 0 | 0 |
| De Hamel, E. | Middleton Hall, Tamworth | 1 | 0 | 0 |
| De Knoop, J. | Calveley Hall, Tarporley | 1 | 0 | 0 |
| Demuth, R. H. | | 1 | 0 | 0 |
| Dening, C. & Co. | Chard, Somerset | 1 | 0 | 0 |
| Dennis, S. | Latton, Cricklade, Wilts | 1 | 0 | 0 |
| Denny, G. A. | | 1 | 0 | 0 |
| †Devas, H. G. | Hartfield, Hayes, Kent | | .. | |
| *Devon, The Earl of | Powderham Castle, Devon | 2 | 0 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| *Devonshire, Duke of | Chatsworth, Derbyshire | 5 | 0 | 0 |
| Dew, W. S. | Newton St. Loe, Bristol | 1 | 0 | 0 |
| De Weyer, Col. Victor Bates Van | New Lodge, Winchfield, Windsor | 1 | 1 | 0 |
| Dickson and Robinson | Cathedral Street, Manchester | 1 | 1 | 0 |
| Dickson's (Ltd.) | Chester | 1 | 1 | 0 |
| †Digby, Lord | Minterne, Cerne Abbas | | .. | |
| Digby, F. J. B. Wingfield | Sherborne | 1 | 0 | 0 |
| †Dobson, H. V. | Perridge House, Shepton Mallet | | .. | |
| Dodington, R. M. | Horsington Park, Templecombe | 1 | 1 | 0 |
| Donati, A. S. | Estate Office, Holnicote, Taunton | 1 | 0 | 0 |
| Dormer, Capt. C. W. C. | Rousham, Oxford | 1 | 0 | 0 |
| Drummond, Col. F. D. W. | Cawdor Estate Office, Carmarthen | 1 | 0 | 0 |
| Drummond, H. W. | 3, Bryanston Square, London, W. | 1 | 0 | 0 |
| Duchesne M. C. | Farnham Common, Slough, Bucks. | 1 | 0 | 0 |
| *Ducie, Earl of | Tortworth Court, Falfield, R.S.O., Glos. | 2 | 0 | 0 |
| Dugdale, J. M. | Llwyn, Llanfyllin, near Oswestry | 1 | 0 | 0 |
| †Dunboyne, Lord | Greendale, Clyst St. Mary, Exeter | | .. | |
| Duncan, R. | Rhoose, near Barry | 1 | 0 | 0 |
| Dunlop, I. M. | Avonhurst, Sneyd Park, Bristol | 1 | 0 | 0 |
| Dyer John | 1, Richmond Villas, Swansea | 1 | 0 | 0 |
| *Dyke, Rt. Hon. Sir W. Hart, Bart. | Lullingston Castle, Eynsford | 2 | 2 | 0 |
| Eagle Range and Gas Stove Company (Ltd.) | CatherineStreet, Aston, Birmingham | 1 | 0 | 0 |
| Eastwood, A. C. | Leigh Court, Taunton | 1 | 0 | 0 |
| *†Eastwood, J. E. | Enton, Witley, Surrey | | .. | |
| Economic Fencing Company (Ltd.) | Billiter House, Billiter Street, London, E.C. | 1 | 0 | 0 |
| Eden, R. H. H. | Sherborne, Dorset | 1 | 0 | 0 |
| †Edgcumbe, Sir Robert Pearce | . . . . . . . . . . | | .. | |
| †Edmondson, A. | Church Farm, Dry Sandford, Abingdon | | .. | |
| Edwards, A. P. | Gogs House, Wedmore, Somerset | 1 | 1 | 0 |
| Edwards, C. L. Fry | The Court, Axbridge, Somerset | 1 | 0 | 0 |
| Edwards, W. H. G. | Butcombe Court, Wrington | 1 | 0 | 0 |
| Eldridge, Pope & Co. | Dorchester | 1 | 0 | 0 |
| Elliott, Sir Thomas H., Bart. | 4, Whitehall Place, London, S. W. | 1 | 1 | 0 |
| Elliott, T. M. | Biddestone, Chippenham | 1 | 0 | 0 |
| Elton, B. A. | Clevedon Court, Somerset | 1 | 0 | 0 |

| Name. | Residence. | Sub-scriptions. £ | s. | d. |
|---|---|---|---|---|
| *Elton, Sir E., Bart. | Clevedon Court, Clevedon | 2 | 2 | 0 |
| Enderby, Miss E. M. | Beckington, Bath | 1 | 1 | 0 |
| Enfield, Viscount | Dancer's Hill, Barnet | 1 | 0 | 0 |
| Ensor, T. & Sons | Auctioneers, Dorchester | 1 | 0 | 0 |
| Errington, R. | Victoria Mills, Sunderland | 1 | 0 | 0 |
| Esdaile, C. E. T. | Cothelstone House, Taunton | 1 | 0 | 0 |
| Ettle, J., F.R.H.S. | 37, Stanley Grove, Weston-super-Mare | 1 | 1 | 0 |
| Evans, H. M. Glynn | Plasissa, Llangennech, Carmarthenshire | 1 | 0 | 0 |
| Evans, H. R. | Court of Noke, Pembridge, Herefordshire | 1 | 0 | 0 |
| †Evan-Thomas, Commander A. | Caerwnon, Builth Wells, R.S.O. |  | .. |  |
| †Eve, Mr. Justice | Pullabrook, Bovey Tracy, South Devon |  | .. |  |
| Evelyn, Mrs. | Wotton House, nr. Dorking | 1 | 0 | 0 |
|  |  |  |  |  |
| *Falmouth, Viscount | Tregothnan, Truro | 2 | 0 | 0 |
| †Farmer, S. W. | Little Bedwyn, Wilts |  | .. |  |
| †Farwell, E. W. | 11, Laura Place, Bath |  | .. |  |
| Fastnut (Ltd.) | 115, Newgate Street, London | 1 | 1 | 0 |
| Faudel-Phillips, H. | Mapleton Stud, Edenbridge, Kent | 1 | 0 | 0 |
| Fellowes, Right Hon. A. E. | Honingham, Norfolk | 1 | 0 | 0 |
| Fenton, A. D. | Maristow, Roborough, S. Devon | 0 | 10 | 0 |
| Ferrand, G. F. | Morland Hall, Alton, Hants | 1 | 0 | 0 |
| Finlay, Col. Alexander | Little Brickhill, Bletchley, Bucks | 1 | 0 | 0 |
| Finn, L. & G. | Westwood Court, Faversham | 1 | 0 | 0 |
| *Fitzgerald, Sir Maurice, Bt. (The Knight of Kerry) | Buckland, Faringdon, Berks | 2 | 0 | 0 |
| *Fitzhardinge, Lord | Cranford House, Hounslow | 2 | 0 | 0 |
| Fleming, J. Willis | Stoneham Park, Eastleigh, Hants | 1 | 0 | 0 |
| Fletcher, E. E. | 224, Oxford Street, Swansea | 1 | 1 | 0 |
| †Fletcher, Lionel J. W. | West Farleigh, Maidstone |  | .. |  |
| Flower, James | Chilmark, Salisbury | 1 | 0 | 0 |
| *†Forester, Capt. F. W. | Saxilbye Park, Melton Mowbray |  | .. |  |
| Forrest, Col. W. | St. Fagan's, Cardiff | 1 | 0 | 0 |
| Forster, J. C. | Clatford Mills, Andover | 1 | 0 | 0 |
| †Fortescue, J. B. | Boconnoc, Lostwithiel, Cornwall |  | .. |  |
| Fortt, A. H. | Hatfield House, Hatfield Place, Bath | 1 | 0 | 0 |
| Foster-Harter, G. L. | Salperton Park, Compton Abdale, R.S.O., Glos. | 1 | 0 | 0 |
| Four Oaks Spraying Machine Co. (Ltd.) | Four Oaks Works, Sutton Coldfield | 1 | 0 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Fowler & de la Perrelle | Porter's Lane, Southampton | 1 | 0 | 0 |
| †Fowler, G. | Claremont, Taunton | | .. | |
| Fowler, J. & Co. (Ltd.) | Leeds | 1 | 0 | 0 |
| Fox, Brothers & Co. | Wellington, Somerset | 1 | 1 | 0 |
| Fox, C. L. | Rumwell Hall, Taunton | 1 | 0 | 0 |
| Fox, Mrs. A. | Brislington House, near Bristol | 1 | 0 | 0 |
| †Fox, Robert | Grove Hill, Falmouth | | .. | |
| Fox, R. A. | Yate House, Yate, Glos. | 1 | 0 | 0 |
| Fox, R. W. | Grimstone, Horrabridge, Devon | 1 | 0 | 0 |
| Foxcroft, C. T. | Hinton Charterhouse, Bath | 1 | 1 | 0 |
| *Fremlin, W. T. | Milgate Park, Maidstone | 2 | 0 | 0 |
| Fry, A. | Zion Hill, Clifton, Bristol | 1 | 0 | 0 |
| Fry, A. M. | 8, Sion House, Clifton, Bristol | 1 | 1 | 0 |
| Fry, H. A. | 19, Monmouth Place, Bath | 1 | 1 | 0 |
| *Fry, J. F. | Ford Abbey, Chard | 2 | 0 | 0 |
| *Fry, J. S. & Sons (Ltd.) | Union Street, Bristol | 2 | 2 | 0 |
| †Fuller, G. Pargiter | Neston Park, Corsham | | .. | |
| Fuller, S. and A. | Bath | 1 | 0 | 0 |
| Fursdon, E. S. | St. Martin's, Kingskerswell, Devon | 1 | 1 | 0 |
| Fyson & Co. (Ltd.) | Union Street, Bath | 1 | 1 | 0 |
| Gardiner, Sons & Co. | Nelson Street, Bristol | 1 | 1 | 0 |
| Garne, W. | Aldsworth, Northleach | 1 | 1 | 0 |
| Garne, W. T. | Aldsworth, Northleach | 1 | 1 | 0 |
| *Garratt, Lt.-Col. T. A. T. | Bishop's Court, Exeter | 2 | 2 | 0 |
| Garrett, W. | Backwell Hill House, West Town, R.S.O., Somerset | 1 | 0 | 0 |
| Garton, Jas. | Clarendon Park, Salisbury | 1 | 0 | 0 |
| Gartons (Ltd.) | Warrington | 1 | 1 | 0 |
| Gear, W. H. | Bridge Street, Bath | 1 | 1 | 0 |
| *†George, William E., J.P. | Downside, Stoke Bishop, Bristol | | .. | |
| Gibbins, T. | Glynfelin, Neath | 1 | 1 | 0 |
| Gibbons, George | Tunley Farm, near Bath | 1 | 0 | 0 |
| †Gibbons, H. | Church Farm, Clutton, Bristol | | .. | |
| Gibbons, P., J.P. | Keynsham | 1 | 1 | 0 |
| Gibbs, A. H. | Pytte, Clyst St. George, Topsham, Devon | 1 | 0 | 0 |
| *†Gibbs, G. A., M.P. | Tyntesfield, Bristol | | .. | |
| †Gibbs, H. M. | Barrow Court, Flax Bourton, Bristol | | .. | |
| Gibson, J. T. | Claverham, near Yatton | 1 | 1 | 0 |
| Gill, P. O. | Uplands, Wrington, Somerset | 1 | 0 | 0 |
| Gillingham, J. and Son | Prospect House, Chard | 1 | 0 | 0 |
| †Gladstone, J. | Bowden Park, Chippenham | | .. | |
| Glantawe, Lord | The Grange, Swansea | 1 | 0 | 0 |
| Glencross, T. | The Loose Box, Weston-super-Mare | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Glyn, R. F. | The Cross House, Fontmell Magna, Shaftesbury | 1 | 0 | 0 |
| *Glyn, Sir Richard G., Bart. | Gaunt's House. Wimborne | 2 | 2 | 0 |
| Godfrey, W. J. | Exmouth | 1 | 1 | 0 |
| †Godman, C. B. | Woldringfold, Horsham | | .. | |
| Godman, J. | The Raswells, Hascombe, Godalming | 1 | 0 | 0 |
| †Goldney, Sir Prior, Bart., C.B. | Derriads, Chippenham | | .. | |
| Gomer, W. | Killerton Estate Office, Broadclyst, Exeter | 1 | 0 | 0 |
| Goodden, J. R. P. | Compton House, Sherborne | 1 | 0 | 0 |
| Goodman, A. & Co. | 3, Hammett Street, Taunton, and Broad Street House, London, E.C. | 1 | 0 | 0 |
| Gordon, G. H. | The Barn House, Sherborne | 1 | 0 | 0 |
| Goring, C. | Wiston Park, Steyning | 1 | 0 | 0 |
| †Gorringe, Hugh | Kingston-by-Sea, Brighton | | .. | |
| Grace, A. | 39, Welsh Back, Bristol | 1 | 0 | 0 |
| Grant, C. E. | Bursar, King's College, Cambridge. | 1 | 0 | 0 |
| Grant, W. J. | Pentonville, Newport, Mon. | 1 | 0 | 0 |
| Gray, R. | The Estate Office, Sherborne | 1 | 0 | 0 |
| Greaves, R. M. | Wern, Portmadoc, North Wales | 1 | 0 | 0 |
| †Greenall, Mrs. C. E. | The Manor, Carltone Scroop, Grantham | | .. | |
| †Greenall, Sir G., Bart. | Walton Hall, Warrington | | .. | |
| Greenslade, W. R. J. | Fairfield, Trull, Taunton | 1 | 0 | 0 |
| Greenway, W. | Halse, Taunton | 1 | 0 | 0 |
| Greenwell, Sir W., Bart. | Marden Park, Woldingham, Surrey | 1 | 0 | 0 |
| Greenwood, J. C. | Claverton Down, Bath | 1 | 0 | 0 |
| Gregor, T. | 11, Sketty Road, Swansea | 1 | 0 | 0 |
| Gregory, W. | Wellington, Somerset | 1 | 0 | 0 |
| †Guest, Lady Theodora | Inwood, Templecombe. | | .. | |
| Guille, H. C. de Stevens | St. George, Castel, Guernsey | 1 | 0 | 0 |
| Guise, Sir W. F., Bart. | Elmore Court, Gloucester | 1 | 0 | 0 |
| Gunther, C. E. | Tongswood, Hawkhurst, Kent | 1 | 0 | 0 |
| Habgood, G. | Harley Lodge, Wimborne | 1 | 0 | 0 |
| Hall, A. C. | The Manor, Great Rollright, Chipping Norton | 1 | 0 | 0 |
| *Hambleden, Viscount | Greenlands, Henley-on-Thames | 5 | 0 | 0 |
| †Hambro, Sir Everard A. | Hayes Place, Beckenham, Kent | | .. | |
| Hancock, Rev. Prebendary F. | The Priory, Dunster, Somerset | 1 | 0 | 0 |
| Hancock, H. C. | The Court, Milverton, Taunton | 1 | 0 | 0 |
| Hancock, Mrs. R. D. | Halse, Taunton | 1 | 0 | 0 |
| Harbottle, E. | Topsham | 1 | 0 | 0 |
| Harding, C. | Upton Grove, Tetbury | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Harding, R. | Fenswood Farm, Long Ashton, Bristol | 1 | 0 | 0 |
| Harpur, W. | Borough Engineer, Cardiff | 1 | 0 | 0 |
| Harris, C. & T. (Ltd.). | Bacon Curers, Calne, Wilts | 1 | 0 | 0 |
| Harris, H. | Singleton Park Farm, Sketty, S.O., Glam. | 1 | 0 | 0 |
| Harris, J. M. | Chilvester Lodge, Calne, Wilts | 1 | 0 | 0 |
| Harrison, D. | The Grove, Tenby | 1 | 0 | 0 |
| Harrison, McGregor & Co. | Leigh, Lancashire | 1 | 0 | 0 |
| Haversham, Lord | Trevina, Tintagel, Cornwall | 1 | 0 | 0 |
| Haward, T. W.. | Brombil House, Margam, Port Talbot | 1 | 1 | 0 |
| Hawkins, A. W. Bailey | Stagenhoe Park, Welwyn, Herts | 1 | 0 | 0 |
| Hawkins, Mrs. | 10, Portland Place, London, W. | 1 | 1 | 0 |
| †Haydon, Lt.-Col. W. H. | Maidford, Malmesbury, Wilts | | .. | |
| Hayes, F. J. | West Pennard, Glastonbury | 1 | 0 | 0 |
| Heathcoat-Amory, Sir I. M., Bart. | Hensleigh, Tiverton, Devon | 1 | 0 | 0 |
| Hember, S. H. | Queen Charlton, near Bristol | 1 | 0 | 0 |
| †Henderson, A. N. | Street Ashton House, Lutterworth | | .. | |
| Henderson, Sir A., Bart. | Buscot Park, Faringdon, Berks | 1 | 1 | 0 |
| Heneage, Capt. R.N. | Parc le Breos, Penmaen, Glam. | 1 | 0 | 0 |
| Henry, Lt.-Col. F. | Elmstree, Tetbury | 1 | 0 | 0 |
| Hepple, E. M. | Camerton, near Bath | 1 | 0 | 0 |
| Herbert, Maj.-Gen. Sir Ivor, Bart., M.P. | Llanarth Court, Raglan, Mon. | 1 | 0 | 0 |
| Hesse, F. W. | Bloomfield House, Bloomfield Road, Bath | 1 | 0 | 0 |
| †Hewitt, G. Southby. | Day, Son & Hewitt, 22, Dorset Street, London, W. | | .. | |
| Hick, W. A. | Wayfield, Batheaston, Bath. | 1 | 0 | 0 |
| Higgins, B. | Millhouse Farm, Evercreech | 0 | 10 | 0 |
| Hignett, G. | Hodshill, South Stoke, Bath | 1 | 0 | 0 |
| †Hill, B. H. | Uphill, Weston-super-Mare | | .. | |
| Hill, Edward | Stratton House, Evercreech | 1 | 0 | 0 |
| Hill, H. | Paulton, near Bristol | 1 | 1 | 0 |
| Hill, V. T. | Mendip Lodge, Langford, Bristol | 1 | 1 | 0 |
| Hill, W. B. | 342, Priestwood Road, Wolverhampton | 1 | 0 | 0 |
| Hill, Capt. W. J. M. | Westwood House, West Bergholt, Essex | 1 | 0 | 0 |
| Hippisley & Sons | Wells, Somerset | 1 | 0 | 0 |
| Hippisley, R. J. B. | Ston Easton Park, Bath | 1 | 0 | 0 |
| Hiscock, A. | Motcombe, Dorset | 1 | 0 | 0 |
| †Hoare, Sir H. H. A., Bart. | Stourhead, Zeals, S.O., Wilts. | | .. | |
| Hoare, H. C. | Stourhead, Bruton | 1 | 0 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| *Hobhouse, Rt. Hon. H. | Hadspen House, Castle Cary. | 2 | 0 | 0 |
| †Hoddinott, S. | Worminster, Shepton Mallet | | .. | |
| Holder, H. Newton | c/o Thos. Bigg (Ltd.), 11½, Great Dover Street, London, S.E. | 1 | 0 | 0 |
| Holland and Coombs | Bristol | 1 | 0 | 0 |
| Holt Needham, O. N. | Barton Court, Colwall, near Malvern | 1 | 0 | 0 |
| †Hooper, R. N. | Stanshawes Court, Chipping Sodbury | | .. | |
| †Hope, W. H. B. | Eastwood, East Harptree, Bristol | | .. | |
| Hopper, H. R. | Merryweather & Sons, Greenwich Road, London, S.E. | 1 | 1 | 0 |
| †Horner, Sir J. F. Fortescue | Mells Park, Frome | | .. | |
| Hornsby and Sons (Ltd.) | Grantham, Lincoln | 1 | 0 | 0 |
| Horton, Rev. Le G. | Wellow Vicarage, Bath | 1 | 1 | 0 |
| Hosegood, A. W. | Williton, Taunton | 1 | 0 | 0 |
| Hosegood, Obed., jun. | Dillington, Ilminster | 0 | 10 | 0 |
| Hosken, W. J. | Pulsack, Hayle, Cornwall | 1 | 1 | 0 |
| Hoskin, E. H. | Cartuther Barton, Liskeard | 1 | 0 | 0 |
| †Hoskins, R. J. | Beard Hill, Shepton Mallet | | .. | |
| Hoskyns, H. W. P. | North Perrott Manor, Crewkerne, Somerset | 1 | 0 | 0 |
| Houldsworth, A. F. | Widcombe, Kingsbridge, Devon | 1 | 1 | 0 |
| Howard, J. and F. | Britannia Works, Bedford | 1 | 0 | 0 |
| Hudson, E. V. | Wolseley Works, Witton, Birmingham | 1 | 0 | 0 |
| †Hughes, A. E. | Wintercott, Leominster | | .. | |
| Humphries, Sidney | Eastfield Lodge, Westbury-on-Trym, Bristol | 1 | 1 | 0 |
| Hunter, Sir Charles, Bart., M.P. | 1, West Eaton Place, London, S.W. | 1 | 0 | 0 |
| †Hurle J. C. | Brislington Hill, Bristol | | .. | |
| Hurst and Son | 152, Houndsditch, London | 1 | 0 | 0 |
| Hussey, J. W. | Bouverie House, Exeter | 1 | 0 | 0 |
| †Hylton, Lord | Charlton, near Radstock | | .. | |
| Ibbotson, R. | The Hawthorns, Knowle, Warwickshire | 1 | 0 | 0 |
| *Ilchester, Earl of | Melbury, Dorchester | 2 | 2 | 0 |
| Imbert-Terry, H. M. | Strete Raleigh, Whimple | 1 | 0 | 0 |
| Imperial Accident Insurance Co. | 17, Pall Mall, East, London, S.W. | 1 | 0 | 0 |
| Innes, G. P. Mitchell | Craig-yr-Haul, Castleton, Cardiff | 1 | 0 | 0 |
| International Harvester Co. (Ltd.) | 80, Finsbury Pavement, London, E.C. | 1 | 0 | 0 |
| Ireland, A. C. | Brislington Hall, near Bristol | 1 | 1 | 0 |
| Irvine, H. O. | Southerndon, Bridgend, Glam. | 1 | 0 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| *Islington, Lord | Hartham Park, Corsham | 2 | 0 | 0 |
| *Ismay, J. H. | Iwerne Minster, Blandford, Dorset | 2 | 0 | 0 |
| Jackman, Percy | Pulteney Hotel, Bath | 1 | 0 | 0 |
| Jackson, Sir H. M., Bart. | Llantillio Court, Abergavenny | 1 | 0 | 0 |
| James, S. | Ham Farm, Shepton Mallet | 1 | 0 | 0 |
| Jardine, E., M.P. | The Park, Nottingham | 1 | 1 | 0 |
| Jarmain, T. M. | Haseley Iron Works, Tetsworth | 1 | 1 | 0 |
| Jefferis, Mrs. | Harefield Hall, Willsbridge, Glos. | 1 | 0 | 0 |
| Jenkins, D. | Flemingston Court, Cowbridge, Glam. | 1 | 0 | 0 |
| Jenkins, E. | c/o F. Capern, Lewin's Mead, Bristol | 1 | 0 | 0 |
| Jenkins, Captain Vaughan | St. Winifreds, Combe Down, Bath | 1 | 0 | 0 |
| Jenkins, W. H. P. | Frenchay Park, Bristol | 1 | 0 | 0 |
| *Jersey, Earl of | Middleton Hall, Bicester, Oxon | 2 | 0 | 0 |
| †Jervoise, Mrs. B. A. L. | Herriard Park, Basingstoke | | .. | |
| Jervoise, F. H. T. | Herriard Park, Basingstoke | 1 | 1 | 0 |
| Jeyes' Sanitary Compounds Company | Cannon Street, London, E.C. | 1 | 0 | 0 |
| John, E. | Cowbridge, Glamorgan | 1 | 0 | 0 |
| Johns, W. B. | 25, Pargiter Road, Bearwood, near Birmingham | 1 | 0 | 0 |
| Jones, T. S. | Frondez, Radyr, Cardiff | 1 | 0 | 0 |
| Jones, W. | Penciseley, near Cardiff | 1 | 0 | 0 |
| Keel, W. W. | Stanton Drew, Somerset | 1 | 0 | 0 |
| Keeling, G. | North Hill Farm, Dunkerton, Bath | 1 | 0 | 0 |
| Keene, James B. & Co. | *Journal* Office, Bath | 1 | 0 | 0 |
| Kekewich, T. H., J.P. | Peamore, Exeter | 1 | 0 | 0 |
| Kell & Co. | Gloucester | 1 | 0 | 0 |
| Kelly, Col. A. L. | Cadbury House, Wincanton, Somerset | 1 | 0 | 0 |
| Kelway, W. | Huish Episcopi, Langport | 1 | 1 | 0 |
| Kemble, C. A. | Hallatrow, Bristol | 1 | 0 | 0 |
| †Kemp, L. J. | Maer, Exmouth | | .. | |
| Kennaway, Rt. Hon. Sir J. H., Bart., M.P. | Escot, Ottery St. Mary | 1 | 1 | 0 |
| Kennaway, J. | Escot, Ottery St. Mary | 1 | 0 | 0 |
| †Kettlewell, W. W. | East Harptree Court, Bristol | | .. | |
| *Keyser, C. E. | Aldermaston Court, Reading | 2 | 0 | 0 |
| Keyworth, J. and H. & Co. | Tarleton Street, Liverpool | 1 | 0 | 0 |
| King, J., M.P. | Sandhouse, Witley, Surrey | 1 | 0 | 0 |
| King and Sons, R. | Milsom Street, Bath | 1 | 1 | 0 |
| King, W. E. M. | Donhead Lodge, Salisbury | 1 | 0 | 0 |
| Kingwell, H. J. | Great Aish, South Brent, S. Devon | 1 | 0 | 0 |
| Kinneir, H. | Redville, Swindon | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Kirkham, T. L. | Perdiswell Hall, Worcester | 1 | 0 | 0 |
| Knight, S. J. | Walnut Farm, East Dundry, near Bristol | 1 | 0 | 0 |
| †Knollys, C. R. | Weekley, Kettering | | .. | |
| Knox, E. | Kilmersdon, Bath | 1 | 1 | 0 |
| †Kruse, W. | Perran Bay House, Perranporth, Cornwall. | | .. | |
| †Lake, C. | Oakley, Higham, Kent | | .. | |
| Lane, A. P. | Arthur's Club, St. James's, London | 1 | 0 | 0 |
| *Lansdowne, Marquis of | Bowood, Calne | 2 | 0 | 0 |
| Larkworthy, E. W. | Messrs. J. L. Larkworthy & Co., Worcester | 1 | 0 | 0 |
| †Latham, T. | Dorchester, Oxon | | .. | |
| Lear, F. G. | The Reddings, nr. Cheltenham | 1 | 0 | 0 |
| Lear, H. H. | Blenheim Home Farms, Woodstock, Oxon. | 1 | 0 | 0 |
| Lee, Major-Gen. H. H. | The Mount, Dinas Powis, Cardiff | 1 | 0 | 0 |
| Leeder, E. H. | Mount Pleasant House, Swansea | 1 | 0 | 0 |
| Lees, Sir T., Bart. | South Lychett Manor, Poole | 1 | 1 | 0 |
| Le Feuvre, F. V. | La Fosse, St. Peter's, Jersey | 1 | 0 | 0 |
| Legard, A. G. | Brow Hill, Batheaston, Bath | 1 | 0 | 0 |
| Lennard, Sir H., Bart. | Wickham Court, West Wickham, Kent | 1 | 0 | 0 |
| Lethbridge, Charles | Carlton Club, London, S.W. | 1 | 0 | 0 |
| Leverton, W. A. | Columb John Farm, Stoke Canon, Exeter | 1 | 0 | 0 |
| Leverton, W. | Woolleigh Barton, Beaford, North Devon | 0 | 10 | 0 |
| Lewis, Col. H. | Green Meadow, near Cardiff | 1 | 1 | 0 |
| Lewis, Wm. and Son | *Herald* Office, Bath | 1 | 0 | 0 |
| †Ley, John Henry | Trehill, Exeter | | .. | |
| †Leyland, C. J. | Haggerston Castle, Beal, Northumberland | | .. | |
| Liddell, C. O. | Shirenewton Hall, Chepstow | 1 | 1 | 0 |
| Liddon, E., M.D. | Silver Street House, Taunton | 1 | 0 | 0 |
| Linton, E. N. | Westgate Chambers, Newport, Mon. | 1 | 0 | 0 |
| Lipscomb, Godfrey | Margam Park, Port Talbot | 1 | 0 | 0 |
| Lister, R. A. & Co. (Ltd.) | Dursley, Glos. | 1 | 1 | 0 |
| †Lister, J. J. | Warninglid Grange, Haywards Heath | | .. | |
| Llewellyn, Lieut.-Col. A. | Writtenhall, Bewdley, Worcestershire | 1 | 0 | 0 |
| Llewellyn, Llewellyn T. E. | Hackwood, Basingstoke | 1 | 1 | 0 |
| *Llewelyn, Sir J. T. D., Bart. | Penllergaer, Swansea | 2 | 2 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Lloyd, J. C. | Dinas, Brecon | 1 | 0 | 0 |
| Lock, B. J. | Tudney Farm, Ilminster | 0 | 10 | 0 |
| *†Long, Rt. Hon. Walter H., M.P. | Rood Ashton, Trowbridge | .. | | |
| Long, Col. William | Woodlands, Congresbury, Somerset | 1 | 0 | 0 |
| Long, W. F. | New Barnes Farm, Bromyard | 1 | 0 | 0 |
| Longrigg, G. E. | Weston Lea, Bath | 1 | 0 | 0 |
| Lopes, Sir H. Y. Buller, Bart. | Maristow, Roborough, Devon | 1 | 0 | 0 |
| Loram, Brothers | Cathedral Dairy, Exeter | 1 | 1 | 0 |
| Lovelace, T. | Bratton Court, Minehead, Somerset | 1 | 0 | 0 |
| Lubbock, Major G. | Greenhill, Warminster, Wilts | 1 | 0 | 0 |
| Lucas, Lord | West Park, Ampthill | 1 | 0 | 0 |
| Ludlow, Lord | | 1 | 0 | 0 |
| †Lutley, J. H. | Brockampton, Worcester | .. | | |
| Luttrell, Capt. A. F. | Court House, East Quantoxhead, Bridgwater | 1 | 0 | 0 |
| Luttrell, Claude M. F. | 15, Gay Street, Bath | 1 | 1 | 0 |

| Name. | Residence. | £ | s. | d. |
|---|---|---|---|---|
| *MacAndrew, J. J. | Lukesland, Ivybridge | 2 | 0 | 0 |
| McCalmont, D. H. B.. | Crockford's Hall, Newmarket | 1 | 1 | 0 |
| Macdonald, H. L. S. | Avondale, Bathford, Bath | 1 | 0 | 0 |
| Macdonald, K. | 5, Sion Hill, Bath | 1 | 0 | 0 |
| McIntosh, Mrs. C. M. | Havering Park, Havering Atte Bower, Essex | 1 | 1 | 0 |
| Major, H. J. and C. (Ltd.) | Bridgwater | 1 | 0 | 0 |
| Mallett, W. E. | The Octagon, Bath | 1 | 0 | 0 |
| †Mansell, A. E. | Mount Vernon, Melton Mowbray, Tasmania | .. | | |
| Marcus, M. | High Trees, Redhill, Surrey | 1 | 0 | 0 |
| Marden, E. D. | Marston House, Marston Magna, Bath | 1 | 0 | 0 |
| Marfell, R. H. | Great House Farm, Llangeview, Usk | 1 | 0 | 0 |
| Marken, E. R. | Henstaff Court, Pontyclun, R.S.O.. | 1 | 1 | 0 |
| Marker, Richard | Combe, near Honiton | 1 | 0 | 0 |
| Marshall, L. H. | Chippenham | 1 | 0 | 0 |
| Marshall, Sons & Co. (Ld.) | Britannia Iron Works, Gainsborough | 1 | 0 | 0 |
| Martin, E. G. Bromley | St. Cloud, Callow End, Worcester | 1 | 0 | 0 |
| Martin, J. | Thorverton, R.S.O., Devon | 1 | 0 | 0 |
| Martin, L. J. (Associated Manufacturers' Assn.) | 72-80, Mansell Street, Aldgate, London, E.C. | 1 | 0 | 0 |
| Martin and Carnes | Taunton | 1 | 1 | 0 |
| Martyn, G. | Tremeddan, Liskeard, Cornwall | 1 | 1 | 0 |
| Mason, F. F. | Swansea | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. £ | s. | d. |
|---|---|---|---|---|
| Massey-Harris Co. (Ltd.), (C. W. Dawkins, General Manager) . . . | 54 & 55, Bunhill Row, London, E.C. . . . . . . | 1 | 0 | 0 |
| Masters, A. . . . | 29, St. Mary Street, Cardiff . . | 1 | 0 | 0 |
| Mathews, Ernest . . | Little Shardeloes, Amersham, Bucks . . . . . . | 1 | 0 | 0 |
| Mathews, E. R. Norris, F.R.Hist. Soc. . . | Central Library, Bristol . . | 1 | 0 | 0 |
| Matthews, Adam . . | The Cornhill Stud, Swansea . . | 1 | 0 | 0 |
| Matthews, David . . | Llwyneryr, Morriston, Glam. . | 1 | 0 | 0 |
| Matthews, L. B. . . | Milton, Gillingham, Dorset . . | 1 | 0 | 0 |
| Maule, Major-Gen. H. B. . | 2, Penn Lea Road, Newbridge Hill, Bath . . . . . . | 1 | 0 | 0 |
| Maule, M. St. John . . | Chapel House, Bath . . . | 1 | 0 | 0 |
| May, A. C. . . . | Avon House, Stoke Bishop, Bristol | 1 | 0 | 0 |
| Meade-King, W. O. . . | Walford House, Taunton . . | 1 | 0 | 0 |
| Meager, F. F. . . . | Melbourne House, Swansea . . | 1 | 0 | 0 |
| Meddick, William G. . . | 11, Great Stanhope Street, Bath . | 1 | 0 | 0 |
| Medlycott, H. M. . . | Milborne Port, Somerset . . | 1 | 0 | 0 |
| Membery, R. . . . | 37, Southgate Street, Bath . . | 1 | 0 | 0 |
| Merriman, J. W. . . | 126, Bryn Road, Swansea . . | 1 | 0 | 0 |
| Merry, Richard . . . | Goulds, Broadclyst, Exeter . . | 0 | 10 | 0 |
| Merryweather, J. C. . . | 4, Whitehall Court, London, S.W. | 1 | 0 | 0 |
| Methuen, General Lord, C.B., C.M.G. . . . . . | Corsham Court, Wilts . . . | 1 | 0 | 0 |
| Miers, R. H. P. . . . | Clydach-on-Tawe, Glam. . . | 1 | 0 | 0 |
| Mildmay, Capt. C. B. St. J. . | Hallam, Dulverton . . . | 1 | 0 | 0 |
| †Mildred, G. B. . . . | Newington House, Craven Arms, Shropshire . . . . . | | .. | |
| Millbank, Sir Powlett C. J., Bart. . . . | Norton Manor, Presteign . . | 1 | 0 | 0 |
| Miller, T. H. . . . | Clan Villa, Bathwick Hill, Bath . | 1 | 0 | 0 |
| Miller-Hallett, A. . . | Goddington, Chelsfield, Kent . | 1 | 1 | 0 |
| Mills, B. W. . . . | 31, Cambridge Place, Paddington, London, W. . . . . | 1 | 0 | 0 |
| Mitchell, A. C. . . . | Highgrove, Tetbury . . . | 1 | 0 | 0 |
| Molassine Co. (Ltd.) . . | East Greenwich, London, S.E. . | 1 | 0 | 0 |
| Moody, C. . . . | Maisemoor, Evercreech . . | 1 | 0 | 0 |
| Moore-Gwyn, J. E. . . | Duffryn, Neath, Glamorgan . . | 1 | 0 | 0 |
| †Moore, H. F. . . . | Renée House, 48, Dulwich Road, Herne Hill, S.E. . . . . | | .. | |
| Moore, Sir Newton J., K.C.M.G. . . | Savoy House, Strand, London, W.C. | 1 | 1 | 0 |
| Moore-Stevens, Col. R. A. . | Winscott, Torrington, Devon . | 1 | 0 | 0 |
| Morant, Mrs. E. . . | Brokenhurst Park, Hants . . | 1 | 0 | 0 |
| Morel, C. E. . . . | . . . . . . . . . | 1 | 0 | 0 |
| *Moreton, Lord . . . | Sarsden Lodge, Chipping Norton . | 2 | 2 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| *Morgan, T. | Capital and Counties Bank Buildings, Taff Street, Pontypridd | 2 | 2 | 0 |
| Morgan, W. A. | Winthankley, St. Andrew's, Fife | 1 | 1 | 0 |
| *Morley, Earl of | Saltram, Plympton, Devon | 2 | 0 | 0 |
| Morley, Charles | Shockerwick, Bath | 1 | 1 | 0 |
| *Morris, C. | Highfield Hall, St. Albans | 2 | 0 | 0 |
| Morris and Griffin (Ltd.) | Maindee, Newport, Mon. | 1 | 1 | 0 |
| Morris, Sir R. A., Bart. | Sketty Park, Swansea | 1 | 0 | 0 |
| Morris, Son and Peard | Auctioneers, North Curry, Taunton | 1 | 0 | 0 |
| Morrison, Captain J. A. | Berwick House, Hindon, Salisbury | 1 | 0 | 0 |
| †Morrison, J. A. | Basildon Park, Reading | | .. | |
| *Mount-Edgcumbe, Earl of | Mount Edgcumbe, Devonport | 2 | 2 | 0 |
| †Mucklow, E., J.P. | Woodhill, Bury, Lancashire | | .. | |
| Müller, Jansen | Newport, Mon. | 1 | 0 | 0 |
| Munn, F. | Dumballs Road, Cardiff | 1 | 0 | 0 |
| Muntz, F. E. | Umberslade, Hockley Heath, Warwickshire | 1 | 0 | 0 |
| Muntz, J. O. | Goodameavy, Yelverton | 1 | 0 | 0 |
| Murray-Anderdon, H. Edwd. | Henlade House, Taunton | 1 | 1 | 0 |
| Napier, H. B. | Ashton Court Estate Office, Long Ashton, Bristol | 1 | 1 | 0 |
| Neagle, D. T. | London, Glos. and N. Hants Dairy Company, Clifton, Bristol | 1 | 0 | 0 |
| Neal, J. F. | Kingsdon, Taunton | 1 | 0 | 0 |
| Neeld, Sir A. D., Bart., C.B. | Grittleton, Chippenham | 1 | 0 | 0 |
| Nelder, C. W. | Carnarvon Arms, Dulverton, Somerset | 0 | 10 | 0 |
| †Neville-Grenville, Robert | Butleigh Court, Glastonbury | | .. | |
| New, H. G. | Craddock, Cullompton, Devon | 1 | 0 | 0 |
| Newington, C. | Oakover, Ticehurst, Sussex | 1 | 0 | 0 |
| Newman, Sir R. H. S. D. L., Bart. | Mamhead Park, near Exeter | 1 | 1 | 0 |
| Newsham, J. C. | . . . . . . . | 1 | 0 | 0 |
| Nicholetts, E. C. | The Lons, Bitton, Gloucestershire | 1 | 0 | 0 |
| Nichols, G. | 49, Broad Street, Bristol | 1 | 0 | 0 |
| Nitrogen Fertilisers (Ltd.) | Winchester House, Old Bond Street, London, E.C. | 1 | 0 | 0 |
| Nix, J. | Tilgate, Crawley, Sussex | 1 | 1 | 0 |
| Nixon, W. | The University, Bristol | 1 | 0 | 0 |
| *Normanton, Earl of | Somerley, Ringwood | 2 | 0 | 0 |
| North, G. F. | Stratfield Saye, Mortimer, R.S.O., Berks. | 1 | 0 | 0 |
| *Northumberland, Duke of | Albury Park, Guildford | 5 | 0 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Oakey, G. | Brittleware Farm, Charlwood, Surrey | 1 | 0 | 0 |
| Oakley, H. E. | Dewstow, near Chepstow | 1 | 0 | 0 |
| †O'Hagan, Lord | Pyrgo Park, Havering Atte Bower, Romford, Essex | | .. | |
| O'Halloran, Miss P. | Fairwood Lodge, Killay, R.S.O., Glam. | 1 | 0 | 0 |
| Olver, J. C. | Woodland Valley, Ladock, Cornwall | 1 | 0 | 0 |
| Osborne, J. | 9, Clifton Park, Clifton | 1 | 1 | 0 |
| Osborne, W. | Barrack Farm, Odd Down, Bath | 1 | 0 | 0 |
| Osmond and Son | Grimsby | 1 | 0 | 0 |
| Paget, A. B. | Church Farm, Fawley, Hants | 1 | 0 | 0 |
| Paget, L. C. | Middlethorpe Hall, Yorks | 1 | 0 | 0 |
| *Paget, Sir Richard, Bart. | 9, King's Bench Walk, Temple, London | 2 | 0 | 0 |
| Pain, W. H. | High House, Kingsbridge | 1 | 0 | 0 |
| Palmer, G. Ll. | Lackham, Lacock, Wilts | 1 | 0 | 0 |
| †Palmer, R. | Lodge Farm, Nazeing, Waltham Cross, Essex | | .. | |
| Palmer, W. H. | York Buildings, Bridgwater | 1 | 0 | 0 |
| †Parker, Hon. Cecil T. | The Grove, Corsham, Wilts | | .. | |
| Parker, F. J. | Plymouth Street, Swansea | 1 | 0 | 0 |
| Parmiter, P. J. & Co. | Tisbury, Wilts | 1 | 0 | 0 |
| Parry-Okeden, E. | Turnworth, Blandford | 1 | 0 | 0 |
| Parry-Okeden, Lieut.-Col. U. E. P. | Turnworth, Blandford | 1 | 0 | 0 |
| †Parsons, J. D. Toogood, jun. | Manor View, Rusthall, Tunbridge Wells | | .. | |
| †Parsons, R. M. P. | Misterton, Crewkerne | | .. | |
| Pass, A. D. | Manor House, Wootton Fitzpaine, Charmouth, Dorset | 1 | 0 | 0 |
| Peacock, W. | 3, Buckingham Gate, London | 1 | 1 | 0 |
| Pearce, S. & Co. | 46a, Market Street, Manchester | 1 | 0 | 0 |
| Pearse, T. C. | Leigh Farm, Dulverton | 1 | 0 | 0 |
| Peel, E. Morton | South View, Shetty, R.S.O. | 1 | 0 | 0 |
| Peel, Viscount | 52, Grosvenor Street, London, W. | 1 | 1 | 0 |
| Pember, G. H. | . . . . . . . . . | 1 | 0 | 0 |
| Penberthy, Professor J. | Dean Hall, Newnham, Glos. | 1 | 0 | 0 |
| Pendarves, W. Cole | Pendarves, Camborne, Cornwall | 1 | 1 | 0 |
| Perkins, Col. E. K. | Shales, Bitterné, Hants | 1 | 1 | 0 |
| Perowne, Col. J. T. Woodrych | Conservative Club, St. James Street, London, S.W. | 1 | 0 | 0 |
| †Perry-Herrick, Mrs. | Beau Manor Park, Loughborough | | .. | |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Petherick, R., jun. | Acland Barton, Landkey, Barnstaple | 0 | 10 | 0 |
| Petters (Ltd.) | Yeovil | 1 | 0 | 0 |
| Pettifer, T. & Co. | Eydon, Banbury | 1 | 0 | 0 |
| †Pettifer, T. Valentine, J.P., F.R.C.V.S. | The Knoll, Tetbury, Gloucester | | .. | |
| Phillips, F. | Nantcoch, Newport, Mon. | 1 | 1 | 0 |
| Phillips, G. | The Gaer, Newport, Mon. | 1 | 0 | 0 |
| Phillips, J. | Messrs. J. Phillips & Co., Bath | 1 | 0 | 0 |
| Phillips, L. R. | | 1 | 1 | 0 |
| Piggott, Brothers & Co. | 59, Bishopsgate Street Without, London, E.C. | 1 | 0 | 0 |
| Pike, C. A. | Chilean Nitrate Committee, Friar's House, 39-41, New Broad Street, London, E.C. | 1 | 0 | 0 |
| †Pinney, R. W. P. | Sutton Veny, Warminster | | .. | |
| †Pitt, W. | South Stoke House, Bath | | .. | |
| Plaister, C. | Church Farm, Monkton Combe, Bath | 1 | 0 | 0 |
| Plumptre, H. F. | Goodnestone, Dover | 1 | 0 | 0 |
| *Plymouth, Earl of | Hewell Grange, Bromsgrove | 4 | 0 | 0 |
| *Poltimore, Lord | Poltimore Park, Exeter | 3 | 3 | 0 |
| Poole, Mrs. A. R. | King's Hill, Dursley | 1 | 1 | 0 |
| Pope, Alfred | Dorchester | 1 | 0 | 0 |
| Pope, John | Nowers, Wellington, Somerset | 1 | 0 | 0 |
| Pope, S. P. | Howden, Tiverton, N. Devon | 1 | 1 | 0 |
| Popham, H. L. | Hunstrete House, Pensford, Bristol | 1 | 0 | 0 |
| Porter, W. J. H. | Glendale Farm, Wedmore | 1 | 0 | 0 |
| †Portman, Hon. C. B. | Goldicote, Stratford-on-Avon | | .. | |
| Portman, Hon. Mrs. C. B. | Goldicote, Stratford-on-Avon | 1 | 0 | 0 |
| *Portman, Viscount | Bryanston, Blandford | 5 | 0 | 0 |
| Price, Owen | Nantyrharn, Cray, Brecon | 1 | 0 | 0 |
| Prichard, H. L. | Penmaen, R.S.O., Glam. | 1 | 1 | 0 |
| Pritchard, D. F., J.P. | Crumlin Hall, Crumlin, Mon. | 1 | 1 | 0 |
| Proctor, H. and T. (Ltd.) | Cathay, Bristol | 1 | 1 | 0 |
| Pullen, James | Lapdown Farm, Tormarton, Gloucester | 1 | 0 | 0 |
| †Purgold, A. D. | Ebna Lodge, Gobowen, Salop | | .. | |
| Quantock Vale Cider Co. | North Petherton, Bridgwater | 1 | 1 | 0 |
| Quested, J. E. | The Firs, Cheriton, Kent | 1 | 0 | 0 |
| *†Radnor, Earl of | Longford Castle, Salisbury | | .. | |
| †Ransome, B. C. | Orwell Works, Ipswich | | .. | |
| Rawlence, Ernest A. | Newlands, Salisbury | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. £ | s. | d. |
|---|---|---|---|---|
| Rawlence, G. Norman | 7, Moberley Road, Salisbury | 1 | 0 | 0 |
| Read, B. | Church Farm, Cam, Dursley. Gloucester | 1 | 0 | 0 |
| Rees, D. | Brynbedw, Tylorstown, Glam. | 1 | 1 | 0 |
| Rees, W. J. | The Laurels, Swansea | 1 | 1 | 0 |
| Reeves, Robert and John, and Son | Bratton Iron Works, Westbury, Wilts | 1 | 0 | 0 |
| Remnant J. F., M.P. | The Grange, Hare Hatch, Twyford | 1 | 0 | 0 |
| Rice, Rees | Velindre, Morriston, Glam. | 0 | 10 | 0 |
| Richardson, Rev. A. | Bath and County Club, Bath | 1 | 0 | 0 |
| Riley, J. L. & A. | The Iwerne, near Ledbury | 1 | 0 | 0 |
| Robins, J. | High Bray, South Molton | 0 | 10 | 0 |
| Robins, T. | Gratton Barton, High Bray, South Molton | 1 | 0 | 0 |
| Robinson, E. S. & A. (Ltd.) | Redcliffe Street, Bristol | 1 | 1 | 0 |
| Robinson, John & Co. | Bristol | 1 | 1 | 0 |
| Roe, W. J. | West Pennard, Glastonbury | 1 | 0 | 0 |
| Rogers, E. P. | Burncoose, Perranwell, Cornwall | 1 | 0 | 0 |
| Rogerson, R. W. | Ward and Co., Northgate Street, Bath | 1 | 0 | 0 |
| Rolleston, S. V. | Saltford House, Saltford, Bristol | 1 | 0 | 0 |
| Rolleston, Col. V., J. P. | Saltford House, near Bristol | 1 | 1 | 0 |
| Rouse-Boughton, Sir W. St. A., Bart. | Downton Hall, Ludlow | 1 | 0 | 0 |
| Rouse-Boughton, Lady | Downton Hall, Ludlow | 1 | 0 | 0 |
| Rowden, A. Roger | Hill End, Eastnor, Ledbury | 1 | 0 | 0 |
| Rowliffe, E. L. | Hall Place, Cranleigh, Guildford | 1 | 1 | 0 |
| Royal Guernsey Agricultural and Horticultural Society | Guernsey | 1 | 0 | 0 |
| Ruston, Proctor & Co. (Ltd ) | Lincoln | 1 | 0 | 0 |
| Rutherford, J. A. | Highclere Estate Office, Newbury, Berks | 1 | 0 | 0 |
| Saillard, P. | Buchan Hill, Crawley, Sussex | 1 | 0 | 0 |
| St. Audries, Lord | St. Audries, Bridgwater | 1 | 1 | 0 |
| *St. Germans, Earl of | St. Germans, Cornwall | 2 | 0 | 0 |
| †Salmon, H. C. | North Field, Bridgwater | | .. | |
| Salter, Benjamin | Newlands, Broadclyst, Exeter | 1 | 0 | 0 |
| Salter, T. | Beare Farm, Broadclyst, Exeter | 1 | 0 | 0 |
| Samuel, A. | 74, Mansel Terrace, Swansea | 1 | 0 | 0 |
| Samuelson, Ernest | Bodicote Grange, Banbury | 1 | 1 | 0 |
| Sanders, R. A., M.P. | Barwick House, Yeovil | 1 | 0 | 0 |
| Sandys, Capt. G. J., M.P. | Hatherleigh House, Weston-super-Mare | 1 | 1 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Sanford, H. S. J. A. | The Court House, Middlehill, Broadway, Worcestershire | 1 | 0 | 0 |
| Sankey, R. I. | Queen Anne Mansions, St. James's Park, London, S.W. | 1 | 0 | 0 |
| †Scott, T. | Ditton Court, Maidstone | | .. | |
| †Seaton, Lord | Beechwood, Plympton, Devon | | .. | |
| Sedgwick, T. E. | 26, Oriental Street, Poplar, London, E. | 1 | 1 | 0 |
| Senior and Godwin | Auctioneers, Sturminster Newton, Dorset | 1 | 1 | 0 |
| Shakerley, Col. H. W. | Enham Place, Andover | 1 | 0 | 0 |
| †Shaw-Stewart, Walter R. | Hayes, Shaftesbury | | .. | |
| Shatford, F. | Bosmore Farm, Henley-on-Thames | 1 | 0 | 0 |
| *Shelley, Sir John, Bart. | Shobrooke Park, Crediton | 2 | 2 | 0 |
| Shelley, J. F. | Posbury House, near Crediton | 1 | 0 | 0 |
| Sheppard, P. C. O. | Bridgend, Glam. | 1 | 1 | 0 |
| Sheppard, W. A. | 14, Widcombe Crescent, Bath | 1 | 0 | 0 |
| †Sherston, Major C. D. | Evercreech, Somerset | | .. | |
| †Sherston, C. J. T. | Harewood, Leeds | | .. | |
| *Sidmouth, Viscount | Upottery Manor, Honiton | 2 | 0 | 0 |
| Sillifant, A. O. | Culm Leigh, Stoke Canon, Exeter | 1 | 0 | 0 |
| Simonds, L. de L. | Audley's Wood, Basingstoke | 1 | 1 | 0 |
| *Simpson, Charles (Hewthorn & Co.) | Walton Lodge, Broxbourne, Herts | 2 | 0 | 0 |
| Simpson, F. C. | Maypool, Churston Ferrers, R.S.O., S. Devon | 1 | 0 | 0 |
| *Singer, W. M. G. | 42, CharlesStreet, Berkeley Square, London, W. | 2 | 0 | 0 |
| Skinner, G. C. | Pound, Bishops Lydeard | 1 | 0 | 0 |
| Skyrme, J. H. | Madley, Hereford | 1 | 0 | 0 |
| Slatter, J. | Paxford, Campden, S.O., Glos. | 1 | 0 | 0 |
| Smail, J. I. | Warren Wood, Hayes, Kent | 1 | 1 | 0 |
| Smart, G. E. | Combe Hay Manor, Bath | 1 | 1 | 0 |
| Smith, A. J. | Brooklea, St. Anne's Park, Bristol | 1 | 0 | 0 |
| Smith, F. Barry | Barmouth, The Friars, Canterbury. | 1 | 0 | 0 |
| Smith, C. C. F. | Perfect Dairy Machines (Ltd.), 105, Middle Abbey Street, Dublin | 1 | 0 | 0 |
| Smith, Bros. & Co. (Ltd.) | Westgate Buildings, Bath | 1 | 0 | 0 |
| Smith, J. | Monkton, Hereford | 1 | 0 | 0 |
| †Smith, J. W. | Thinghill Court, Hereford | | .. | |
| Smith, Hon. Mrs. Murray | Gumley Hall, Market Harborough | 1 | 0 | 0 |
| †Smith, S. Lee | Larkfield, Maidstone | | .. | |
| Smith-Barry, J. H. | Stowell Park, Pewsey, Wilts. | 1 | 0 | 0 |
| Smyth, Hon. G. N. | Ashton Court, Bristol | 1 | 0 | 0 |
| Smyth, P. | Broford, Dulverton | 1 | 0 | 0 |
| Smyth-Richards, G. C. | Filleigh Lodge, South Molton | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. £ | s. | d. |
|---|---|---|---|---|
| Snow, Major A. D. | Wall Tyning, Bitton, nr. Bristol | 1 | 1 | 0 |
| *Somerset, Duke of | Maiden Bradley, Bath | 2 | 0 | 0 |
| Somerset Trading Co. (Ltd.). | Bridgwater | 1 | 1 | 0 |
| †Somerville, A. F. | Dinder House, Wells, Somerset | | .. | |
| Southwood, J. W. | 1, St. Peter's Terrace, Twerton, Bath | 1 | 0 | 0 |
| Spear Brothers and Clark (Ltd.) | Southgate Street, Bath | 1 | 0 | 0 |
| †Spearman, Sir J. L. E., Bart. | | | .. | |
| Spencer, F. | Pondsmead, Oakhill, Bath | 1 | 1 | 0 |
| Spencer, W. C. | Manor Farm, Hillfield, Cattistock, Dorset | 1 | 0 | 0 |
| Spicer, Capt. | Spye Park, Chippenham | 1 | 0 | 0 |
| Spicer, Lady M. | Spye Park, Chippenham | 1 | 0 | 0 |
| *Spillers and Bakers (Ltd.) | Cardiff | 2 | 0 | 0 |
| Spratts' Patent (Ltd.) | 24 and 25, Fenchurch Street, City, London, E.C. | 1 | 0 | 0 |
| *†Stanley, E. A. V. | | | .. | |
| Stephens, H. C. | Avenue House, Finchley, N. | 1 | 0 | 0 |
| Stevens, R. N. | Woodham Hall, Woking, Surrey | 1 | 0 | 0 |
| Stephenson, R. E. W. | Tue Brook, Liverpool | 1 | 0 | 0 |
| Steward, Major R. H. | Freshford, near Bath | 1 | 0 | 0 |
| Stewart, Rev. H. J. | The Vicarage, Cockett, Glam. | 1 | 0 | 0 |
| Stilgoe H. W. | The Grounds, Adderbury, near Banbury, Oxon | 1 | 0 | 0 |
| Stoddart, F. | Manor House, Walton, Clevedon | 1 | 1 | 0 |
| Stoffell, W. M. | 11, Cavendish Place, Bath | 1 | 1 | 0 |
| Stokes, C. W. Rees | Town Clerk, Tenby | 1 | 1 | 0 |
| Stooke, J. | Sherford, Brixton, Plymouth | 1 | 0 | 0 |
| Storrar, J. I | Grittleton, Chippenham | 1 | 0 | 0 |
| Stothert, P. K. | Bradford-on-Avon, Wilts | 1 | 0 | 0 |
| †Strachie, Lord | Sutton Court, Pensford, Somerset | | .. | |
| Strangways, Hon. H. B. T. | Shapwick, Bridgwater | 1 | 0 | 0 |
| Stratton, Richard | The Duffryn, Newport, Mon. | 1 | 0 | 0 |
| Stride, T. | Stanley House, Camden Road, Bath | 1 | 0 | 0 |
| Strode, G. S. S. | Newnham Park, Plympton | 1 | 0 | 0 |
| Stucley, H. V. G. | Pillhead, Bideford, North Devon | 1 | 0 | 0 |
| Studdy, T. E. | Mazonet, Stoke Gabriel, Totnes | 1 | 0 | 0 |
| Studley, J. Im. | Toller Fratrum, Maiden Newton | 1 | 0 | 0 |
| *Sutton, E. P. F. | Sidmouth Grange, near Reading | 2 | 2 | 0 |
| *Sutton and Sons | Seedsmen, Reading | 2 | 2 | 0 |
| Swansea, Lord | Singleton, Swansea | 1 | 1 | 0 |
| Swanwick, Bruce | R. A. College Farm, Cirencester | 1 | 0 | 0 |
| Symons J. & Co. (Ltd.) | The Plains, Totnes | 1 | 1 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| Talbot, Miss | Margam Park, Port Talbot | 1 | 0 | 0 |
| Tamlin, W. | Talbot House, Stanley Road, Teddington, Middlesex | 1 | 0 | 0 |
| Tangyes (Ltd.) | Cornwall Works, Birmingham | 1 | 0 | 0 |
| Tanner, H. | Westgate Buildings, Bath | 1 | 0 | 0 |
| Tapp, David James | Knaplock, Winsford, Dulverton | 1 | 0 | 0 |
| Tapp, J. A. | Knaplock, Dulverton | 1 | 0 | 0 |
| Tasker W. & Sons (Ltd.) | Waterloo Ironworks, Andover | 1 | 1 | 0 |
| Tate, J. A. | Fairfield, Wells, Somerset | 1 | 0 | 0 |
| Tatem, W. J. | The Court, St. Fagan's, Glam. | 1 | 0 | 0 |
| Taverner, G. E. | Budlake, Devon | 1 | 0 | 0 |
| Taylor, A. H. W. | 8, New Bond Street, Bath | 1 | 0 | 0 |
| †Taylor, George | Cranford, Hounslow, W. | | .. | |
| Taylor, H. W. | Showle Court, Ledbury, Hereford | 1 | 0 | 0 |
| †Tazewell, W. H. | Manor House, Taunton | | .. | |
| *Temple, Earl | Newton St. Loe, Bristol | 2 | 2 | 0 |
| Templeman, G. D. | Hambridge, Curry Rivell, Taunton | 1 | 0 | 0 |
| Thomas, D. A., M.P. | Llanwern, Newport, Mon. | 1 | 1 | 0 |
| Thomas, Sir Griffith | Court Herbert, Neath | 1 | 0 | 0 |
| Thomas, I. | Ely Farm, Cardiff | 1 | 0 | 0 |
| Thomas, J. | Velindre, Kidwelly, Carmarthenshire | 1 | 1 | 0 |
| Thomas, J. A. | Dolgoy, West Cross, R.S.O., Glam. | 1 | 0 | 0 |
| Thomas-Stanford, C. | Preston Manor, Brighton | 1 | 0 | 0 |
| Thomas, W. Meyler | Ynysplwm, Llantrissant | 1 | 0 | 0 |
| Thomas & Evans & John Dyer (Ltd.) | Swansea | 1 | 0 | 0 |
| Thompson, C. E. | Camerton, Bath | 1 | 1 | 0 |
| Thorley, J. | Wood Hall, Shenley, Herts | 1 | 0 | 0 |
| Thorne, J. G. | Horridge, Romansleigh, S. Molton. | 0 | 10 | 0 |
| Thornton, W. A. | Lock, Partridge Green, Sussex | 1 | 0 | 0 |
| Thresher, E. B. | Corfe Hill, Weymouth | 1 | 0 | 0 |
| Thurlow, G. R. | Stowmarket | 1 | 0 | 0 |
| *Thynne, Lord A., M.P. | 15, Manchester Square, London | 2 | 0 | 0 |
| Tidswell, R. J. | Haresfield Court, Stonehouse, Glos. | 1 | 0 | 0 |
| Tillard, Rear-Admiral P. F. | Alford House, Castle Cary | 1 | 0 | 0 |
| Tilley, W. T. S. | East Compton, Shepton Mallet | 1 | 0 | 0 |
| Timmins, T. B. | 24, Green Park, Bath | 1 | 0 | 0 |
| Tipper, B. C., and Son | Balsall Heath, Birmingham | 1 | 0 | 0 |
| Titt, J. W. | Implement Works, Warminster | 1 | 0 | 0 |
| Toogood, E. K. | Messrs. Toogood & Sons, Southampton | 1 | 0 | 0 |
| Tory, Randolph | Charisworth, Blandford | 1 | 0 | 0 |
| Trafford, G. R. | Hill Court, Ross, Herefordshire | 1 | 1 | 0 |
| *Tredegar, Viscount | Tredegar Park, Newport, Mon. | 2 | 2 | 0 |
| Treffry, I. de C. | Penarwyn, Par Station | 1 | 1 | 0 |
| Trelawney, J. S. | Harewood, Buckfastleigh, Devon | 1 | 0 | 0 |
| †Tremaine, W. H. | Sherborne, Northleach, Glos. | | .. | |
| Tremayne, Capt. W. F. | Carclews, Perran ar Worthal, Truro | 1 | 1 | 0 |

| Name. | Residence. | Sub-scriptions. | | |
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| | | £ | s. | d. |
| Tremayne, Hon. Mrs. | Sydenham, Lewdown, R.S.O., N. Devon | 1 | 0 | 0 |
| Troup, Alan C. | Doddean, Salisbury | 1 | 0 | 0 |
| Troyte, H. | Huntsham Court, Bampton, Devon | 1 | 0 | 0 |
| Troyte, H. A. | Slindon, Arundel, Sussex | 1 | 0 | 0 |
| Trump, W. | Borough Farm, Broadclyst, Exeter | 1 | 0 | 0 |
| Tucker, H. | Sutton Montis, Sparkford, Bath | 1 | 0 | 0 |
| Tucker, M. & Co. | Broad Quay, Bath | 1 | 0 | 0 |
| †Tudway, C. C. | The Cedars, Wells, Somerset | | .. | |
| Turner, J. H. | West Molland, South Molton | 1 | 0 | 0 |
| Turner Brothers | Milsom Street, Bath | 1 | 0 | 0 |
| Turnor, Lt.-Col. W. W. | Pinkney Park, Chippenham | 1 | 0 | 0 |
| Unite, John (Ltd.) | 291, Edgware Road, London | 1 | 0 | 0 |
| Unwin, L. | Tiverton | 1 | 0 | 0 |
| †Vacher, E. P. | Cowfold Lodge, Cowfold, Sussex | | .. | |
| Valletort, Viscount | Mount Edgcumbe, Devonport | 1 | 1 | 0 |
| Vaughan, Rev. Preb. | The Rectory, Wraxall, Somerset | 1 | 0 | 0 |
| Vaughan, W. I. | 9, Queen's Place, Cardiff | 1 | 0 | 0 |
| Veitch, P. | Exeter | 1 | 0 | 0 |
| †Verulam, Earl of | Gorhambury, St. Albans | | .. | |
| Vine & Co. (Ltd.) | Cornhill Chambers, Swansea. | 1 | 1 | 0 |
| Vivian, Mrs. C. C. | Forest Hall, Cockett, Glam. | 1 | 0 | 0 |
| Vivian, C. C. | Forest Hall, Forest Fach, Glam. | 1 | 0 | 0 |
| Vivian, Miss | Clyne, Blackpyl, S. Wales | 1 | 1 | 0 |
| Vivian, Hon. Odo | Sketty, Swansea | 1 | 0 | 0 |
| Waide, W. and Sons | Churn Works, Leeds | 1 | 0 | 0 |
| Waldegrave, Earl | Chewton Priory, Somerset | 1 | 0 | 0 |
| *Waleran, Lord | 44, Hans Mansions, London, S.W. | 2 | 0 | 0 |
| Walker, E. G. F. | The Hollies, Chew Stoke, Bristol | 0 | 10 | 0 |
| Walker, H. | Beach, Bitton, Glos. | 1 | 0 | 0 |
| Wallis and Stevens | North Hants Iron Works, Basingstoke | 1 | 0 | 0 |
| Wallop, Hon. J. | Barton House, Morchard Bishop, Devon | 1 | 0 | 0 |
| Walrond, Hon. L., M.P. | Bradfield, Cullompton | 1 | 1 | 0 |
| †Walsingham, Lord | Merton Hall, Thetford, Norfolk | | .. | |
| Ward, J. E. | Red Lodge, Purton, Wilts | 1 | 0 | 0 |
| Ward, R. B. | Westwood Park, Droitwich | 1 | 0 | 0 |
| Wardlaw, H. and A. | Holway Farm, Sherborne | 1 | 0 | 0 |

| Name. | Residence. | Subscriptions. | | |
|---|---|---|---|---|
| | | £ | s. | d. |
| †Waring, C. E. | Conservative Club, Cardiff | | .. | |
| Waring, H. F. | Farningham Hill, Farningham, Kent | 1 | 0 | 0 |
| Warne, J. | Tregenhayne, Tregony, Grampound Road, Cornwall | 1 | 0 | 0 |
| Warne, T. | Trevisquite Manor, St. Mabyn, R.S.O. | 1 | 0 | 0 |
| †Warner, T. C. | Bretterham Park, Suffolk | | .. | |
| Waterloo Mills Cake and Warehousing Co. (Ltd.) | Wilmington, Hull | 1 | 0 | 0 |
| Watkins, H. R. | Cynghordy, Langland, near Swansea | 1 | 0 | 0 |
| Watson, H. R. | Purse Caundle, Sherborne | 1 | 0 | 0 |
| Watson, T. E. | St. Mary's Lodge, Newport, Mon. | 1 | 0 | 0 |
| Watson, Hon. T. H. | Cormiston, Milverton, Somerset | 1 | 0 | 0 |
| Watts, J. | Backwell, near Bristol | 1 | 0 | 0 |
| *Way, General N. S. | Manor House, Henbury, Bristol | 2 | 0 | 0 |
| Weaver & Co. | Beaufort Warehouses, Swansea | 1 | 0 | 0 |
| Webb, E. and Sons | Wordsley, Stourbridge | 1 | 0 | 0 |
| Webb, H., M.P. | Llwynarthen, Cardiff | 1 | 0 | 0 |
| Weech, J. and Sons | Maudlin Street, Bristol | 1 | 0 | 0 |
| Welch-Thornton, H. | Beaurepaire, Basingstoke | 1 | 1 | 0 |
| Were, J. Kennet | Sidmouth | 1 | 1 | 0 |
| Wernher, Lady | Luton Hoo, Luton | 1 | 0 | 0 |
| Wessex Associated News (Ltd.) | Westgate Street, Bath | 1 | 0 | 0 |
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## CATTLE—*continued.*

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Smith-Barry, J. H., Esq., Stowell Park, Pewsey, Wiltshire, often has young Bulls and Heifers for sale.

Thomas, D. A., Llanweir. Prize-winning herd, including all leading strains. Young Bulls and Heifers always for sale In healthy, outdoor condition. One hour from Hereford; 2½ from London. Particulars apply, A. W. Trotman. Langston Court, near Newport. Telegrams: Langston Court, Newport.

Thornton, Frank H., Kingsthorpe Hall, Northampton. Pedigree Dairy Shorthorns. Winner of many prizes, including First Prize Milking Trials, Royal Show, 1911, and First Prize Heifer Milking Class Dairy Show, 1915. Daily milk records kept. Richness of milk a speciality.

Thornton, Frank H., Kingsthorpe Hall, Northampton. Pedigree Dairy Shorthorns. Winner of many prizes, including 1st Prize Milking Trials, Royal Show, 1911, and 1st Prize Heifer Milking Class; Dairy Show, 1915. Daily milk records kept. Richness of milk a speciality.

Wrench, Right Hon. Frederick, Killacoona, Ballybrack, Ireland. Very high-class herd of Shorthorns, almost entirely consisting of the most valuable Cruikshank tribes; good milkers and free from tuberculosis. Young bulls always on sale. One hour from Dublin.

Wrest Park Herd of Pedigree Dairy Shorthorns, the property of the Rt. Hon. Lord Lucas. Winners of 16 First Prizes and four Championships at the leading agricultural shows in 1914 and 1915, including three First Prizes and two Championships at the R.A.S.E. Shows at Shrewsbury, 1914. and Nottingham, 1915; First and Second Milking Trials R.A.S.E., Nottingham, and First Milking Trials Royal Lancashire Show Blackburn. Daily milk records kept.

## CATTLE—*continued.*

Young Bulls of fashionable strains, good colour, and of the dual purpose type, from heavy milking parents always on sale. Apply to Cecil G. Argles, Estate Office, Wrest Park, Ampthill.

## SHEEP.

### Black Face.

English Black Face Sheep Breeders' Society Show and Sale at Hexham, September. Secretary, John Brannen, Viewlands, Hexham.

### Hampshire Downs.

Judd, Edward Thomas, Cocum, Sutton Scotney, Hants. Highly-bred Flock of 900 registered Hampshire Down Ewes. Noted for great size and early maturity. Annual Sales at Weyhill, Marlborough, Peterborough and Stamford Fairs.

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Finn, Arthur, Westbroke, Lydd, Romney Marsh, Kent. This flock, established for more than 140 years, maintains the highest reputation. Gained first and second prizes in Flock Competitions, 1912–13. Inspection invited of 2,000 registered sheep grazing in Romney Marsh. Selections always for sale.

Hickman, A. J., Court Lodge, Egerton, Kent. Flock 95. Winners of prizes at all the leading shows, including 1st for best woolled ram at Ashford Ram Sale, 1914, 500 competing. Exporter of over 250 rams in 1913 to all parts of the world.

## SHEEP—*continued.*

**WEBB & SON (COMBS), LTD.**, Holders of Bristol Champion Challenge Cup and Colmore Challenge Cup. for best flock of Breeding Ewes (Suffolks), and other prizes. Rams and Ewes on sale. Apply, Raynham, Model Farm, Combe, Stowmarket.

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**BROCKLEBANK, JOSEPH, CARLTON-LE-MOORLAND, NEWARK.** Pure-bred Lincoln Long-wool Sheep, Flock 10. Large numbers are sold for export every year. Given satisfaction both at home and abroad. Inspection invited. Telegrams: Bassingham. Station: Navenby.

### Oxford Downs.

**AKERS CO., HENRY, BLACK BOURTON, CLANFIELD, OXON.** Pedigree Registered Oxford Downs. Ram and Ewe Lambs on sale. Inspection invited. Annual Sales: Oxford Ram Fair, Cirencester, Shrewsbury, Kidderminster, Northampton, Nottingham and Leicester.

**HOBBS, ROBERT W. & SONS, KELMSCOTT, LECHLADE, GLOS.** Flock of 1,000 registered Oxford Downs. Numerous prizes won at the principal shows. Rams, Ram Lambs and Ewes always on sale. Rams sold annually at Oxford, Cirencester, Kelso, Northampton, and other fairs.

**RUTHERFORD, WALTER, CRAILING TOFTS ROXBURGH.** Breeder of pure bred Oxford Sheep. Flock includes winners at the Royal Show of 1913, Royal Counties, and Bath and West Show of 1913. Ewes, Ewe Lambs, and Ram Lambs for sale. Flock number 295. Telegrams: Rutherford, Crailing Tofts, Eckford.

**THE ROYAL PRIZE FARM FLOCK.** Pure Oxford Down Sheep, Shearling Rams, Ram Lambs, Ewes, and Ewe Lambs for sale. Special arrangements with foreign buyers. Many prizes at R.A.S.E. and other Shows, during past 40 years, including 2 firsts, 2 seconds, and 4 other prizes, World's Fair, Chicago; and 25 firsts, and 3 champions at Royal, Bath and West, and Royal Counties, etc., the last four years. Apply, George Adams & Sons, Faringdon, Berks.

## SHEEP—*continued.*

### Ryeland.

**RYELAND SHEEP.** Pedigree and prize-winners at various shows, Royal Worcester, Abergavenny, and others. Rams and young stock always on sale. Inspection invited. Apply Manager, Clytha Park, Abergavenny.

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**MARDEN PARK SOUTHDOWNS**, the property of Sir Walpole Greenwell, Bart. Station: Woldingham (within 17 miles of London, on the London, Brighton, and South Coast Railway). Registered Flock Book No. 77. A number of pure-bred Rams and Ewe Tegs by pedigree sires of the best blood always for sale. Numerous prizes taken in the showyard. For further particulars, apply, W. W. Brindle-Wood, Estate Office, Marden Park, Surrey.

## PIGS.

### Berkshires.

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# BREEDERS' DIRECTORY.

## PIGS—*continued.*

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**Denny, E. H. M., Staplefield Place, Staplefield, Sussex.** Large White Yorkshire Pedigree Pigs. Station Hayward's Heath. Telegrams: Handcross.

**Hughes, Alfred, Packwood Grange, Knowle, near Birmingham.** Select herd of Pedigree Large White Yorkshires, bred from prize-winners. Pigs of various ages for sale at moderate prices.

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**Stapleford Park Herd of Middle White Pigs.** A few Gilts and Boars for Sale. Apply, C. S. Harvey, Wymondham, Oakham.

### Tamworths.

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## MISCELLANEOUS—*continued.*

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## MISCELLANEOUS—*continued.*

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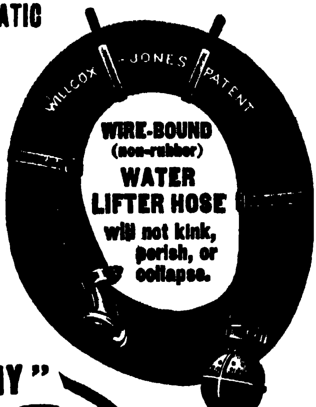

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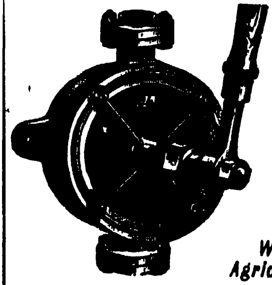

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